"CLOSE-UP: U.S.A." — ALASKA

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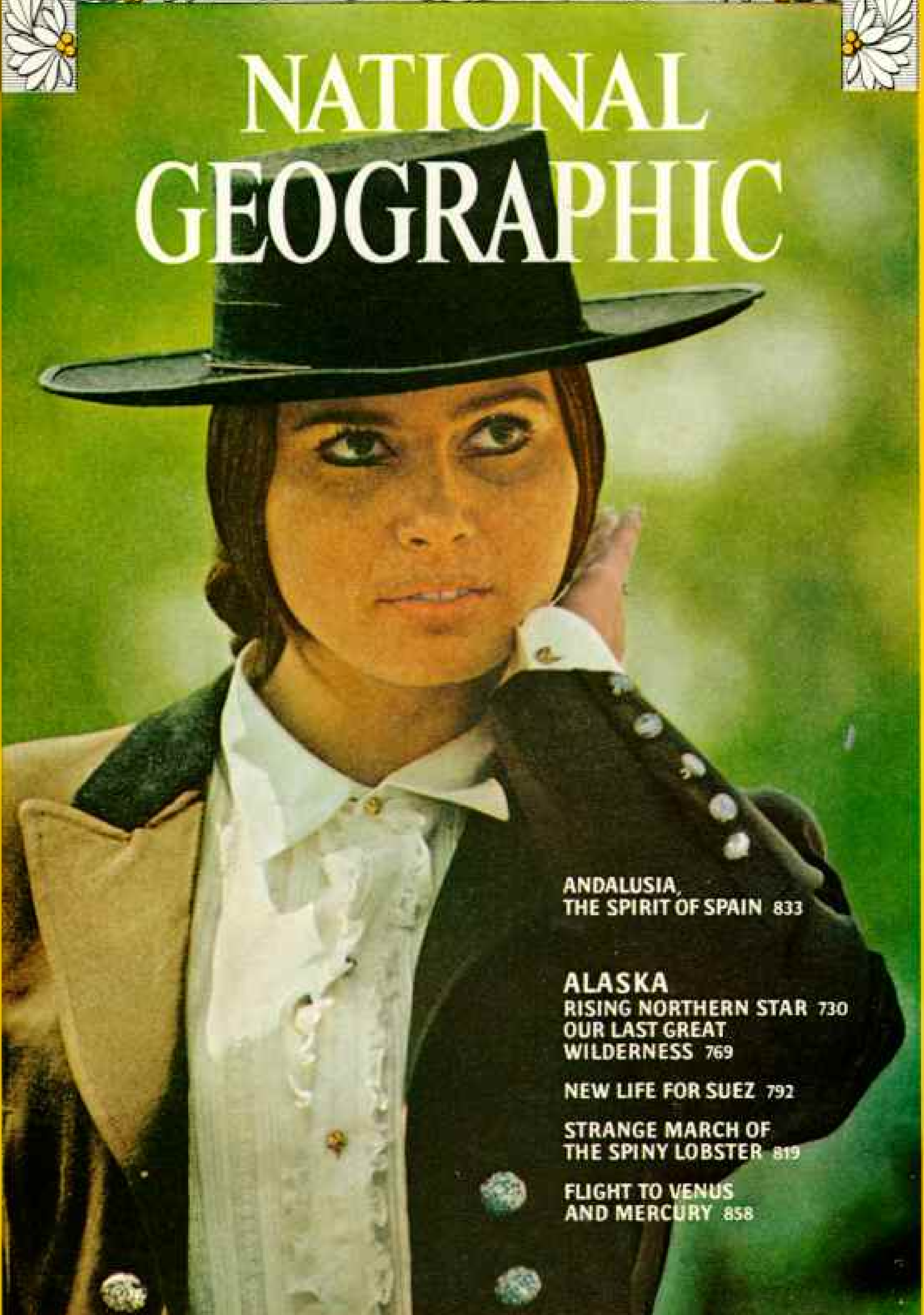

ANDALUSIA, THE SPIRIT OF SPAIN 833

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OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D.C.

WHEN EXPLORER Giovanni de Verrazano was coasting the Carolinas and Virginia in 1524 on the first known voyage of discovery to that part of the eastern United States, he sighted groups of Indians and kidnapped a young boy. Eleven years later Jacques Cartier, meeting Canadian Indians of the St. Lawrence on the site of present-day Quebec, betrayed and kidnapped not only a few braves but the chief as well. Almost every early explorer of note, from Christopher Columbus onward, brought home a number of human beings as living proof of a claim of discovery, as curiosities, and as examples of heathen populations living outside the grace of Christianity.

The question posed then—how are advanced, aggressive, technologically superior nations to treat less-advanced people who "stand in the way"—has never been satisfactorily answered. The years have recorded many would-be solutions: conquest, murder, displacement, education, paternalism, conversion, isolation, almost all of them taken for mistakes by later generations. But the problem has not gone away.

Dozens of GEOGRAPHIC articles have dealt with this dilemma. In the February issue, we described the predicament faced by Brazil, which has chosen the course of pacification, isolation, and gradual conversion to modern ways for its still-wild tribes of the Mato Grosso. Our July issue will present the varying impact of advanced culture on four Negrito tribes of the Andaman Islands in the Bay of Bengal, a process that appears to have dispirited and enervated those who have been longest in contact with outsiders.

Everywhere, it seems, the educational and medical and economic benefits of civilization must be paid for at the cost of the spiritual security, identity, and tradition that surround tribal life. Meanwhile the resurgent interest in Indian cultures and simplified lives has called our attention, especially that of our young, to the values of being "primitive."

The pattern, however, seems to be taking a different, and to me a more hopeful, course in Alaska. The Alaska Native Claims Settlement Act of 1971 is a unique and remarkable instrument for change—acknowledging the aborigines' rights to their domain and purchasing those rights with both money and land. A striking feature, and one distinctly American in character, is the creation of 12 profit-making corporations that could enable their shareholders, Indian, Eskimo, and Aleut, to benefit from the economic development of the state. Not all will, of course, in the nature of things, but this new attack on an age-old problem is both encouraging and creative. To the question posed by those early explorers, a new answer is being tried: Enable the natives to become wealthy enough to save their own culture.

Gilbert M. Grosvenor

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June 1975

Alaska: Rising Northern Star 730

Joseph Judge assesses the people, problems, and promise of a state come of age and seeking to apportion its vast natural bounty. Photographs by Bruce Dale.

Our Last Great Wilderness 769

National parklands would double with proposed addition of 32 million acres of Alaska's surpassingly beautiful wilds. A photographic portfolio, with text by David Jeffery.

New Life for the Troubled Suez Canal 792

Dredges, cranes, and minesweeping helicopters help reopen one of the world's crucial ship channels. William Graves and Jonathan Blair report on Egypt's bold plan for the waterway.

Strange March of the Spiny Lobster 819

Why does a colony of crustaceans migrate, single file and usually southward? Florida marine biologists try to find out. By William F. Herrnkind, Rick Frehsee, and Bruce Mounier.

Andalusia 833

In the homeland of brave bulls, foot-stamping flamenco, and plangent guitars, Howard La Fay and Joseph J. Scherschel capture the living image of old Spain.

Mariner Unveils Venus and Mercury 858

Seen only dimly through earthbound telescopes, our planet's inner sisters reveal startling details to the television eyes of a spindly spacecraft. Science editor Kenneth F. Weaver describes the voyage of Mariner 10.

Four New Geographic Books 870

The Craftsman in America, The Incredible Incas and Their Timeless Land, The Amazing Universe, The Majestic Rocky Mountains.

COVER: *Freckles and lace under a stark black hat, a lovely Andalusian rides at the Seville Fair. Photograph by Joseph J. Scherschel.*

Alaska: Rising Northern Star

By JOSEPH JUDGE
ASSISTANT EDITOR

Photographs by
BRUCE DALE
NATIONAL GEOGRAPHIC PHOTOGRAPHER

In my end is my beginning.
—T. S. ELIOT

IT MAY TURN OUT that in Alaska, that magnificent land where the American frontier finally ran out of ground, the American future took root. At least the attempt is being made.

- The ancient rights of aboriginal peoples to ownership of the land have been acknowledged, those rights have been purchased, at the cost of nearly one billion dollars and 40 million acres, and native groups—Aleut, Eskimo, and Indian—have been given the opportunity to become wealthy profit-making corporations.
- Tens of millions of wilderness acres are being proposed for vast new wildlife refuges, wild rivers, and national parks and forests, precluding commercial development.
- The extraction of mineral wealth is proceeding under scrutiny of conservationists, and with a genuine attempt to study and safeguard environmental values.

"When the history of the United States is written 500 years from now," a professor-historian told me, "Alaska may be the state most worthy of attention. Mistakes that were made 'Outside' with the Indian tribes, with the division of territories irrespective of natural resources, with the devotion to progress regardless of environmental consequences, all these errors of the past are being avoided in Alaska. At least, people are trying to avoid them."

Will they succeed? There are more than a few Alaskans who say, Never!

Near Lake Minchumina, in the remote interior of the Kuskokwim drainage, trapper Tom Flood ties down his dogs, invites me to join him in a moose-meat stew prepared by his Indian-Eskimo wife, Mary, and says, "Parks are necessary for tourists, but the 'bush people' need and deserve their right to a self-sufficient and independent lifestyle. Just because the people Outside have polluted *their* world, why do they have to lock *ours* up?"

On a bitter winter night in Fairbanks, the bars on Second Avenue are steaming with Indians and Eskimos. A sudden scuffle, angry fists. "All that money we are giving these people for their land," says a bartender, "we should have pumped it down a sewer, because that's where it's going."

Old Alaska smiles from the face of Johnny Frank, a former Athapaskan chief who's heading home, firewood cut. No new gas-driven, chain-saw Alaska for him. And 40° below zero isn't bad woodchopping weather, since he's got a good ax and good health at 95.

A herd of stars makes tracks across northern lights in a time exposure taken at minus 58° F. behind Johnny Frank's camp. He has trapped, hunted, and fished all across Alaska's Arctic northeast. Good times were hard enough; bad times were

desperate. Johnny says bullets were once so scarce he shot two dozen rabbits using the same slug over and over. And he recalls the time that the medicine man, who did miracles, could not do one for himself and died of smallpox, when "pretty near all die."

In a small plane soaring above the White Mountains on the way to Fort Yukon, I ask my companion, an Indian activist on his way home, about the remark in the bar.

"That way you saw there is the way of despair," he said. "It was all we had. There is one generation, mine, that I think of as dead. But the young ones, they will not go down that path you saw. Not now."

"Look," says a businessman in Anchorage, "I don't want to be rude, but I would just as soon not spoil a nice evening by even mentioning the word 'conservationist.' They fly around in oil-using airplanes, wear parkas made with oil-based synthetics, and publish their propaganda in oil-based ink, and most of them live somewhere else."

The famous guide is aging, but his eyes still have a keenness of vision as he looks out across the ice field that lies athwart great peaks and spills down in immense glaciers gleaming in the low sun.

"First God made the country, and then we built it," he says, "with practically our bare hands. It is *our* country, and we know how to manage it."

OVER THE PAST YEAR, I heard these and many other voices as I traveled thousands of miles across Alaska, in the endless light of summer and night of winter. I visited remote villages and lonely cabins, walked the new road leading to the oil field at Prudhoe Bay, talked to proud young Eskimo politicians near the Arctic Ocean and conservationists trekking the magnificent Brooks Range. I watched the Anchorage skyline rising and saw Fairbanks boom again. On only two things in this land of change and conflict was everyone agreed: Decisions made now will set Alaska's future for centuries, and the social earthquake that has come upon the state began with the discovery of oil.

The story of that discovery, of the long and bitter legal and propaganda battle over the proposed pipeline, is familiar to most people since it produced a gusher of newsprint over several years. What is not so clear is the value of the state-owned Prudhoe Bay field. When fully developed, each of its 150 wells will be capable of producing an average of 10,000 barrels a day, compared to the average production of a well in the Lower Forty-Eight of 11 barrels a day. The net profit to the oil companies is variously estimated at between three and eight million dollars a day.

With that kind of wealth in the offing, the chief executives of ten oil companies chartered a train and rode back and forth between Calgary and Edmonton, Canada; no one was allowed off until joint bids had been worked out. On September 10, 1969, the State of Alaska opened 1,105 bids to lease 179 tracts of North Slope land, and found itself rich, with nearly a billion dollars in cash.

Alaska's share in the oil bonanza, from future leases and royalties, was expected to pay for a glorious future. People talked excitedly of a monorail to the Arctic Ocean, of a shining new capital, of schools, hospitals, airports, and roads, of living the good life after so many years in the bush cabin.

In general jubilation, though, they were overlooking an annoying but important fact: It was not really clear who owned Alaska.

IN 1959 THE STATE OF ALASKA acquired with its statehood the right to select 103 million acres out of a public domain that encompassed an estimated 270 million acres. Within eight years it had taken title to more than five million acres and was on the verge of acquiring another twelve million, when Alaskan native organizations rose up en masse and proclaimed their aboriginal rights to three-quarters of the state.

It was, perhaps, inevitable that the accumulation of state lands would come a cropper, since hunting, trapping, and fishing lands were notoriously fluid, and ancient land rights that were understood may never have been formalized in a title. There was, too, a growing solidarity among native groups in the face of this pressure on their lands. In 1966 several associations formed the Alaska Federation of Natives, which drew up land-claims bills to send to Washington.

The question of land ownership had been squarely put, and until he got an answer, Secretary of the Interior Stewart L. Udall, who administered much of the state, did a remarkably courageous, or outrageous, thing: He halted the transfer of both federal land and oil and gas leases until the native claims had been settled.

Willie Hensley, the darkly handsome and brilliant Eskimo leader, recalled what followed that action.

"The land freeze went to the state's jugular," Hensley said. "It was a gigantic lever for us. We felt that our course was right, that was the first thing. Many other people wanted other things. The State of Alaska, faced with potential bankruptcy, wanted to push ahead with the oil exploration and land selections. At the same time, conservation groups saw an opportunity to preserve a great portion of the land. The oil companies wanted to verify that their leases were legal, and to build the trans-Alaska pipeline. But we were confident; we had no idea of failure. We had never been defeated by the U. S. Cavalry."

The land freeze remained in force until passage of the Alaska Native Claims Settlement Act five years later. That act is one of the most remarkable—and least understood—pieces of legislation ever passed by a democratic government. In a way it absolves the American conscience of more than 300 years of broken treaties.

But it does more: It makes capitalists out of the aboriginal owners by placing most of their forty million acres in a dozen native-owned-and-administered, profit-making regional corporations, underwritten with funds used to purchase the land from the natives in the first place.

Those who lived through the joy of striking it rich, after so many years of toughing it out in the bush, are having long second thoughts about the price of prosperity. For the cost of getting the oil out has proved to be nothing less than the wholesale subdivision of the state—an act probably unique in history and one that will leave Alaska forever changed.

A POWERFUL TIDE of new-found pride and racial identity now runs through Alaska native life as a result of the land settlement. It has stirred new life from the ashes of neglect and welfare and alcoholism.

This emerging sense of self, almost a tactile presence among the young, is felt strongly in the Eskimo community of Barrow, where an aggressive leadership has had to contend face-to-face with the omnipotent oil interests.

When I arrived in Barrow, it was minus 40° F., and the murk of the midwinter sky shut down what little light penetrated a cloud of ice fog, making ghosts of the few figures walking a bleak landscape. Some young people were gathered in Al's Cafe, the menu of which includes caribou steak, whale steak, and reindeer steak; Beatles music blasted out of the record machine. It was Friday, and the Polar Bear movie theater was converting into a dance hall and general free-for-all. Stacked up outside Shontz's store were crates containing what I estimated to be $38,000 worth of snowmobiles. Inside, magazine racks displayed American sex-oriented publications.

The leadership of the Arctic Slope Regional Corporation was assembled socially in the house used by a visiting Catholic priest. I discovered, to my surprise, that they were watching television, having installed a local cable system not long before.

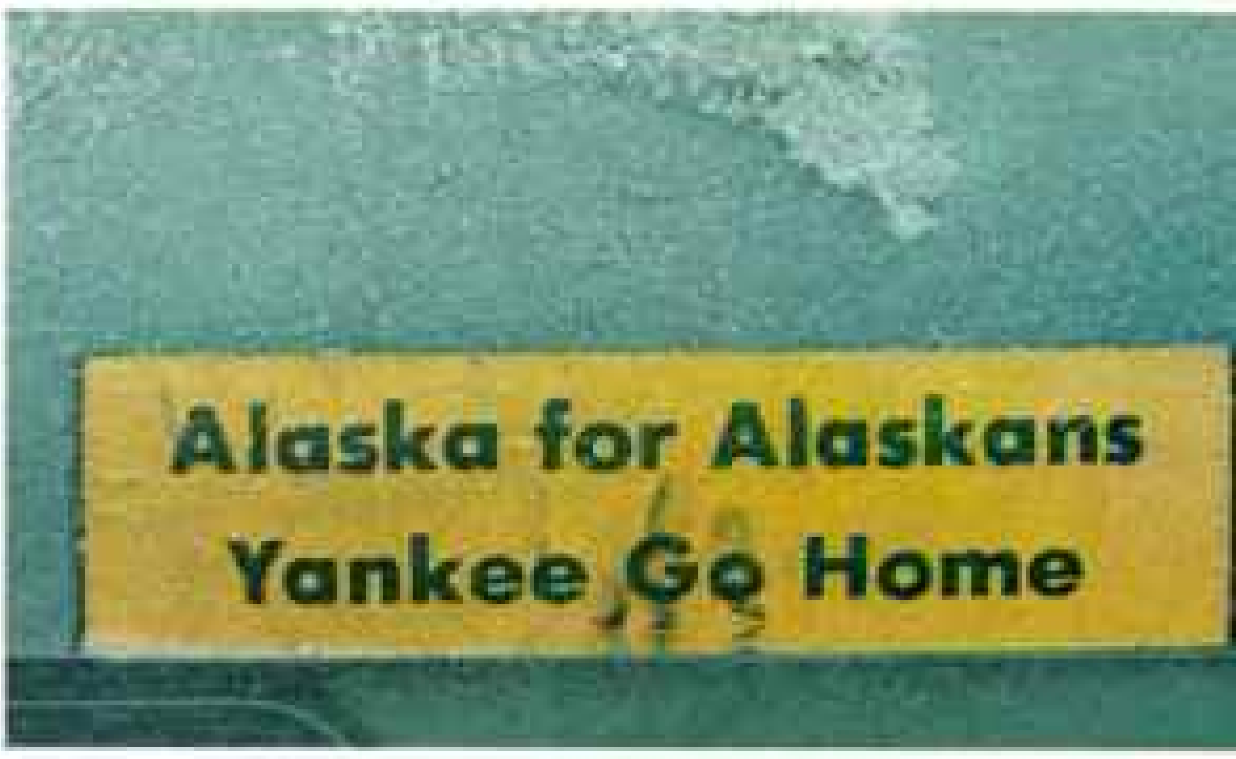
Joe Upicksoun, president of the corporation, and young officials Oliver Leavitt and Jake Adams were discussing with adviser Larry Dinneen a multimillion-dollar agreement they had reached with Standard Oil of California, Union Oil of California, Texaco, and Amoco.

"These are exploration contracts," Mr. Upicksoun told me. "We want to know what's in the ground, and where, and so do they. We want to get some idea of what we are going to be worth so we can plan intelligently."

The corporation is already exceedingly solvent. Under the land-claims act it was awarded 5½ million acres of potentially rich land and 52 million dollars; it has 3,867 shareholders. It put up a new hotel; Barrow is already on the tour map, despite the fact that there is not, at present, an adequate source of drinking water, and the sewage system operates out of "honey buckets."

When I mentioned this, Jake said: "There is nothing wrong with Barrow but people like you. If you people would get out of here, we would be all right."

The conversation turned to whales and became very animated. Oliver's eyes lit up when he described the first sighting in the spring, how the schools empty out, how one



Bumper-sticker manifesto in Anchorage proclaims what many citizens of a former "colony" feel: "Don't tread on us."

kills a bowhead in an ice lead. He leaped up to demonstrate, then said:

"You son of a rhinoceros-hippopotamus, what can you know about it?"

IN BARROW the people enjoy a good hassle, and they have a dandy one going on, with the oil companies squared off against the newly formed North Slope Borough and its mayor, Eben Hopson.

Hopson, realizing that a political entity with taxing powers could perform needed social services while a profit-making corporation could not, forged such a unit encompassing virtually all the North Slope, making it one of the largest political subdivisions in the world. The borough then began to levy taxes against the oil companies and their property in the oil fields. The companies protested the legality of the arrangement, but the Alaska Supreme Court upheld the new government as legitimate.

Then, in one of those peculiarly Alaskan happenings, the legislature met in special session and declared, in effect, that even though the borough had legitimate taxing powers, it could raise only $4,000,000 a year.

"Absolutely discriminatory legislation," Mr. Hopson told me, "that removed from the borough a substantial part of its tax base. The legislature put stiff requirements and limitations on the borough's ability to tax."

The State of Alaska came away with the lion's share of taxes from the oil fields, and

"**An adventurous spirit** and a freewheeling mind" propelled Hans Hafemeister (**above**) from a dock in Hamburg, Germany, to New York City in 1914 and then to Alaska in 1919. Now 80 and retired in Seward, he finds "civilized conventions and increasing regimentation—more people, gadgets, and mass transportation" closing in on Alaska. The people who don't realize what's happening, he says, "have never really been free."

Residents of the Kachemak Bay area (**right**) abruptly realized that change would puncture their tranquillity when the state, despite citizens' protests about a lack of public hearings, granted 62 leases for oil drilling in the bay. Having long satisfied appetites for its shrimp, crab, and salmon, the bay area now faces the insatiable glutton of energy demand.

the Eskimo attempt to get the oil tax money was cut off at the pass.

There are those who look at the infant North Slope Borough, who listen to the rhetoric of the young Eskimo leaders, militant and separatist, and see the beginning of an Eskimo state in that far corner of the United States.

AS MY PLANE BANKED over the village of Wainwright, a dog team pulling a sled went yipping toward an Arctic Ocean solid and white to sight's end.

Homer Bodfish, a strong man with a black mustache, was awaiting the plane. He shared the long seat of his snowmobile as we raced off toward the village.

The snowmobile has made as decisive a change in the way of life of the Eskimo as the automobile did for the people Outside. Almost overnight the dogs began to disappear, although they are being revived now as a result of the oil shortage, and to race.

School was in recess and the kids—half of Wainwright's population of 370—were playing baseball in minus 30° cold. I stopped to admire the ruff on a little girl's parka.

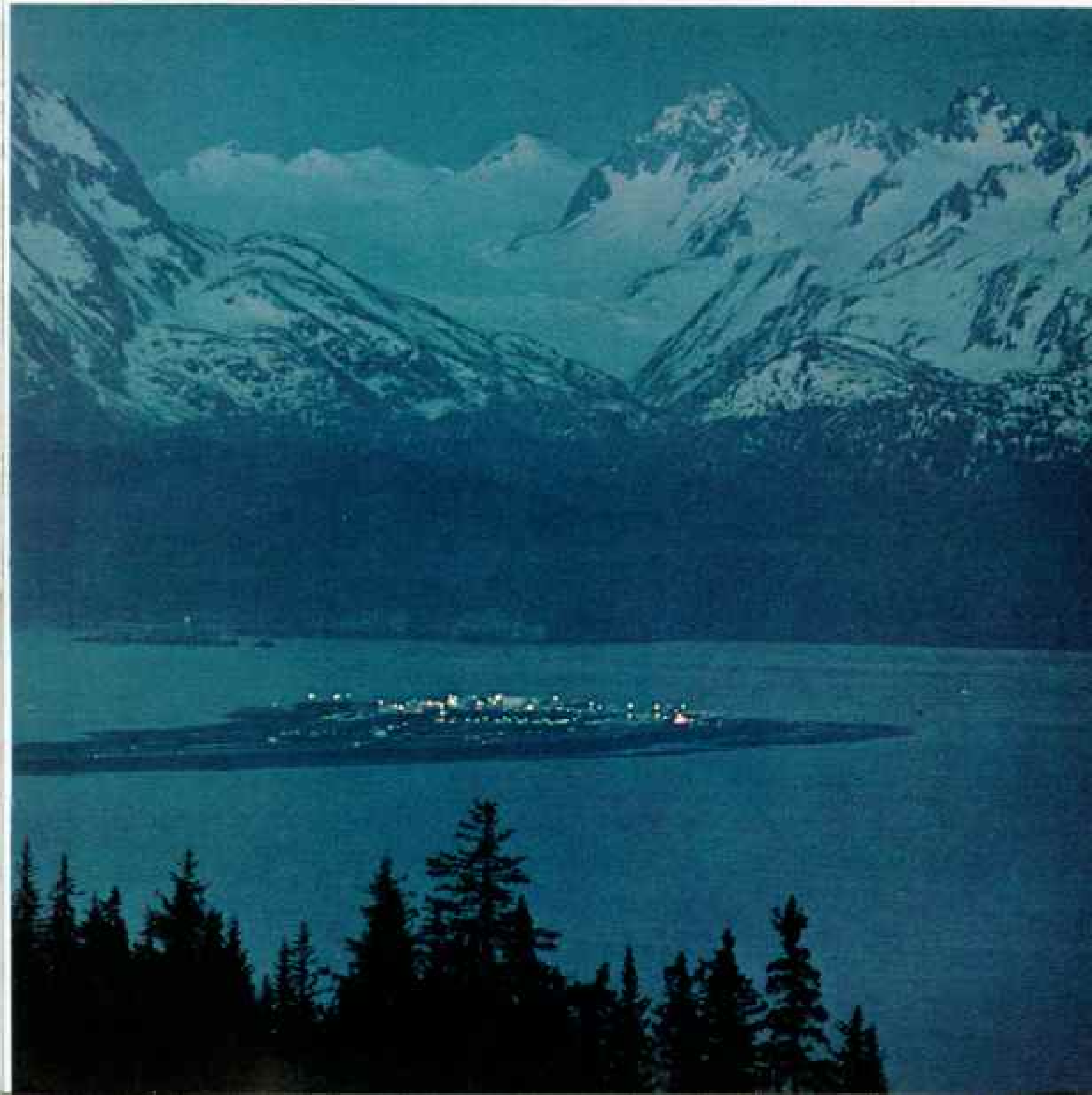
"That's Princess," she said.

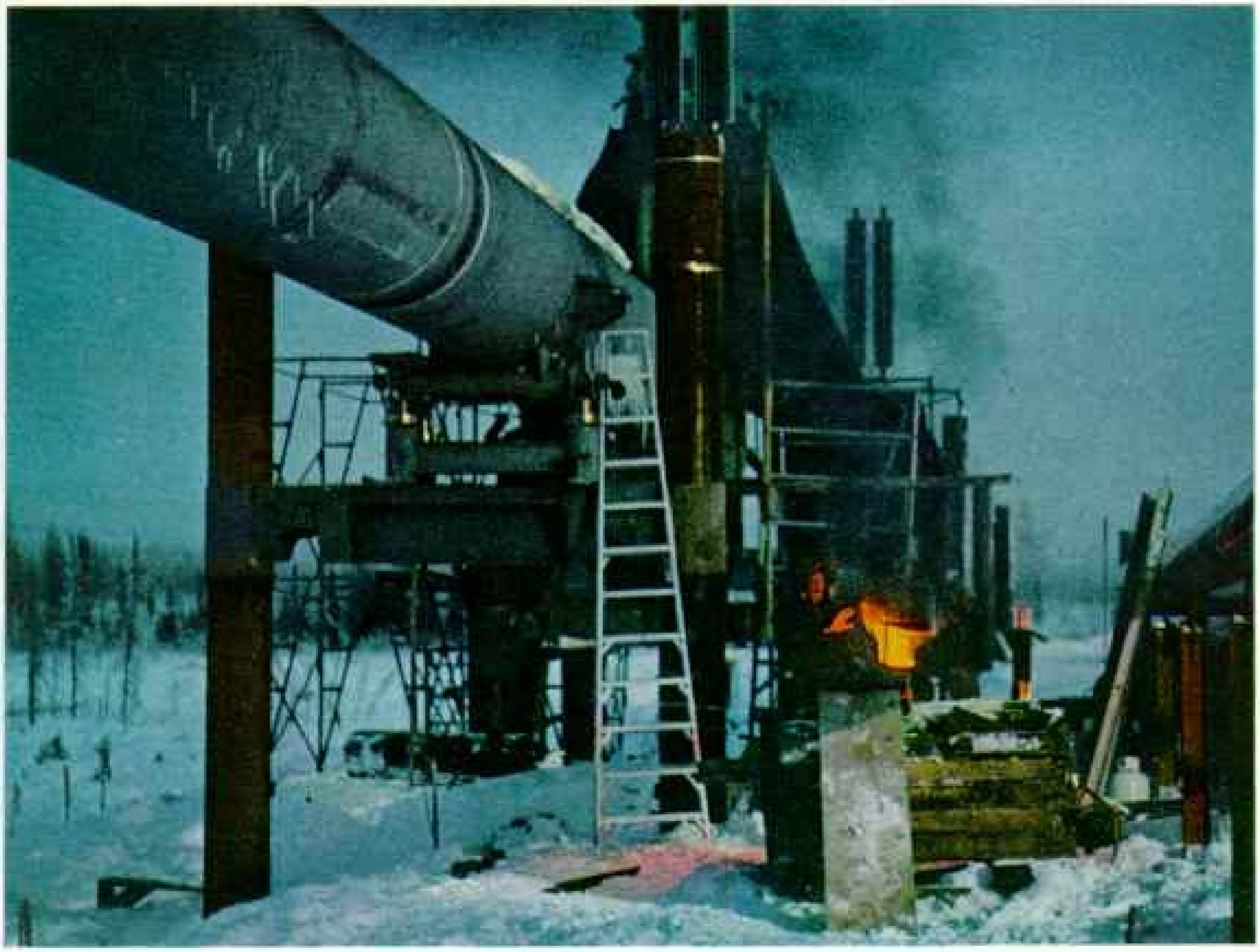
"Princess? That was your dog?"

She nodded, smiled, and skipped away.

We stopped for some frozen whale meat being hacked off a hard chunk by an elderly man, who regarded me without interest.

"I will tell you *(Continued on page 744)*





Oil: lubricating the future

THE WHEELS of Alaska's ongoing division and development squeaked loudly in 1966 when transfer of all lands in the public domain was frozen pending settlement of native land claims. They stopped dead in 1970, two years after discovery of oil on the North Slope, when Athapaskan Indians won an injunction against building a pipeline across their lands.

Passage of the Alaska Native Claims Settlement Act of 1971 cleared the way for resuming the pipeline project. When completed, the line will have crossed 798 difficult miles of permafrost, mountains, floodplains, and faults from Prudhoe Bay to Valdez. Designed to withstand earthquakes and floods, the line will incorporate remote-control valves, like this one near Fairbanks (**above**), to isolate leaks while oil-spill contingency plans are put into effect.

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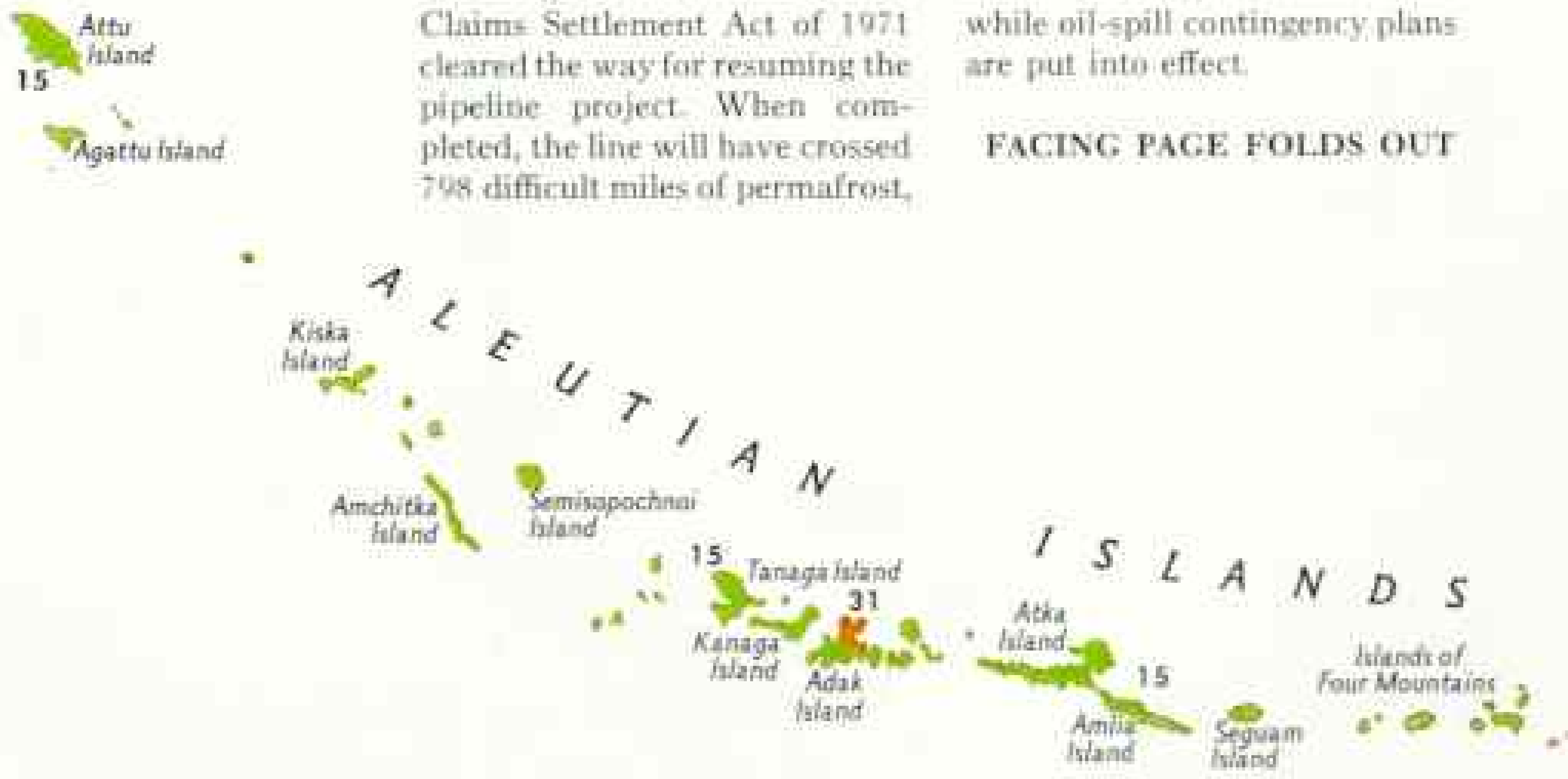
Attu Island
15
Agattu Island
ALEUTIAN ISLANDS
Kiska Island
Amchitka Island
Semisopochnoi Island
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Tanaga Island
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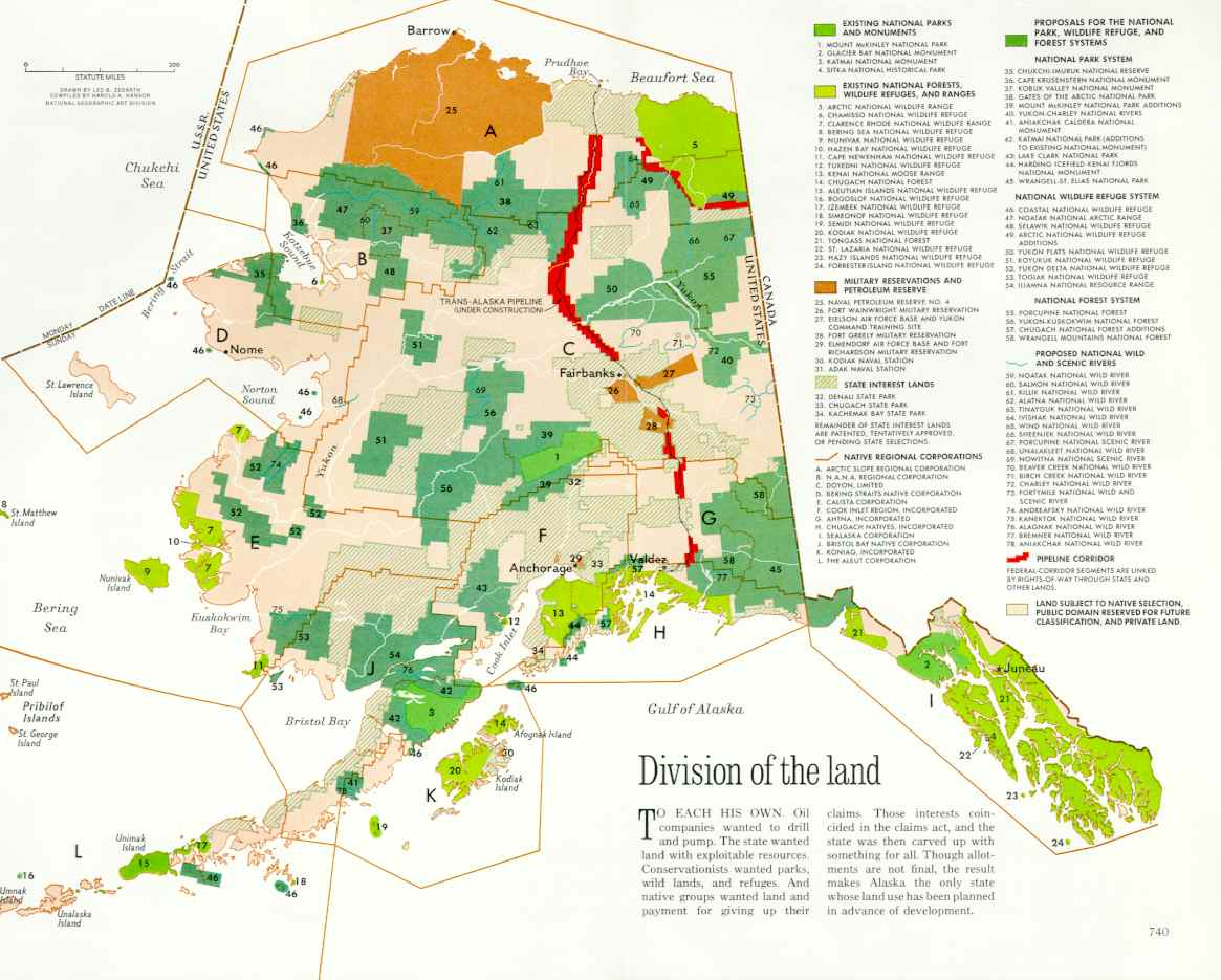
Kanaga Island
Adak Island
Atka Island
15
Amlia Island
Seguam Island
Islands of Four Mountains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200
STATUTE MILES
DRAWN BY LEO B. ZEBARTH
COMPILED BY HAROLD A. HANSON
NATIONAL GEOGRAPHIC ART DIVISION
Barrow
Prudhoe Bay
Beaufort Sea
Chukchi Sea
U.S.S.R.
UNITED STATES
CANADA
UNITED STATES
Kotzebue Sound
Bering Strait
DATE LINE
MONDAY
SUNDAY
Nome
St. Lawrence Island
Norton Sound
St. Matthew Island
Nunivak Island
Bering Sea
Kuskokwim Bay
St. Paul Island
Pribilof Islands
St. George Island
Bristol Bay
Cook Inlet
Afognak Island
Kodiak Island
Unimak Island
Umnak Island
Unalaska Island
Gulf of Alaska
TRANS-ALASKA PIPELINE (UNDER CONSTRUCTION)
Fairbanks
Anchorage
Valdez
Juneau
Yukon
A
B
C
D
E
F
G
H
I
J
K
L

EXISTING NATIONAL PARKS AND MONUMENTS

1. MOUNT McKINLEY NATIONAL PARK
2. GLACIER BAY NATIONAL MONUMENT
3. KATMAI NATIONAL MONUMENT
4. SITKA NATIONAL HISTORICAL PARK

EXISTING NATIONAL FORESTS, WILDLIFE REFUGES, AND RANGES

5. ARCTIC NATIONAL WILDLIFE RANGE
6. CHAMISSO NATIONAL WILDLIFE REFUGE
7. CLARENCE RHODE NATIONAL WILDLIFE RANGE
8. BERING SEA NATIONAL WILDLIFE REFUGE
9. NUNIVAK NATIONAL WILDLIFE REFUGE
10. HAZEN BAY NATIONAL WILDLIFE REFUGE
11. CAPE NEWENHAM NATIONAL WILDLIFE REFUGE
12. TUXEDNI NATIONAL WILDLIFE REFUGE
13. KENAI NATIONAL MOOSE RANGE
14. CHUGACH NATIONAL FOREST
15. ALEUTIAN ISLANDS NATIONAL WILDLIFE REFUGE
16. BOGOSLOF NATIONAL WILDLIFE REFUGE
17. IZEMBEK NATIONAL WILDLIFE REFUGE
18. SIMEONOF NATIONAL WILDLIFE REFUGE
19. SEMIDI NATIONAL WILDLIFE REFUGE
20. KODIAK NATIONAL WILDLIFE REFUGE
21. TONGASS NATIONAL FOREST
22. ST. LAZARIA NATIONAL WILDLIFE REFUGE
23. HAZY ISLANDS NATIONAL WILDLIFE REFUGE
24. FORRESTER ISLAND NATIONAL WILDLIFE REFUGE

MILITARY RESERVATIONS AND PETROLEUM RESERVE

25. NAVAL PETROLEUM RESERVE NO. 4
26. FORT WAINWRIGHT MILITARY RESERVATION
27. EIELSON AIR FORCE BASE AND YUKON COMMAND TRAINING SITE
28. FORT GREELY MILITARY RESERVATION
29. ELMENDORF AIR FORCE BASE AND FORT RICHARDSON MILITARY RESERVATION
30. KODIAK NAVAL STATION
31. ADAK NAVAL STATION

STATE INTEREST LANDS

32. DENALI STATE PARK
33. CHUGACH STATE PARK
34. KACHEMAK BAY STATE PARK

REMAINDER OF STATE INTEREST LANDS ARE PATENTED, TENTATIVELY APPROVED, OR PENDING STATE SELECTIONS.

NATIVE REGIONAL CORPORATIONS

A. ARCTIC SLOPE REGIONAL CORPORATION
B. N.A.N.A. REGIONAL CORPORATION
C. DOYON, LIMITED
D. BERING STRAITS NATIVE CORPORATION
E. CALISTA CORPORATION
F. COOK INLET REGION, INCORPORATED
G. AHTNA, INCORPORATED
H. CHUGACH NATIVES, INCORPORATED
I. SEALASKA CORPORATION
J. BRISTOL BAY NATIVE CORPORATION
K. KONIAG, INCORPORATED
L. THE ALEUT CORPORATION

PROPOSALS FOR THE NATIONAL PARK, WILDLIFE REFUGE, AND FOREST SYSTEMS

NATIONAL PARK SYSTEM

35. CHUKCHI-IMURUK NATIONAL RESERVE
36. CAPE KRUSENSTERN NATIONAL MONUMENT
37. KOBUK VALLEY NATIONAL MONUMENT
38. GATES OF THE ARCTIC NATIONAL PARK
39. MOUNT McKINLEY NATIONAL PARK ADDITIONS
40. YUKON-CHARLEY NATIONAL RIVERS
41. ANIAKCHAK CALDERA NATIONAL MONUMENT
42. KATMAI NATIONAL PARK (ADDITIONS TO EXISTING NATIONAL MONUMENT)
43. LAKE CLARK NATIONAL PARK
44. HARDING ICEFIELD-KENAI FJORDS NATIONAL MONUMENT
45. WRANGELL-ST. ELIAS NATIONAL PARK

NATIONAL WILDLIFE REFUGE SYSTEM

46. COASTAL NATIONAL WILDLIFE REFUGE
47. NOATAK NATIONAL ARCTIC RANGE
48. SELAWIK NATIONAL WILDLIFE REFUGE
49. ARCTIC NATIONAL WILDLIFE REFUGE ADDITIONS
50. YUKON FLATS NATIONAL WILDLIFE REFUGE
51. KOYUKUK NATIONAL WILDLIFE REFUGE
52. YUKON DELTA NATIONAL WILDLIFE REFUGE
53. TOGIAK NATIONAL WILDLIFE REFUGE
54. ILIAMNA NATIONAL RESOURCE RANGE

NATIONAL FOREST SYSTEM

55. PORCUPINE NATIONAL FOREST
56. YUKON-KUSKOKWIM NATIONAL FOREST
57. CHUGACH NATIONAL FOREST ADDITIONS
58. WRANGELL MOUNTAINS NATIONAL FOREST

PROPOSED NATIONAL WILD AND SCENIC RIVERS

59. NOATAK NATIONAL WILD RIVER
60. SALMON NATIONAL WILD RIVER
61. KILLIK NATIONAL WILD RIVER
62. ALATNA NATIONAL WILD RIVER
63. TINAYGUK NATIONAL WILD RIVER
64. IVISHAK NATIONAL WILD RIVER
65. WIND NATIONAL WILD RIVER
66. SHEENJEK NATIONAL WILD RIVER
67. PORCUPINE NATIONAL SCENIC RIVER
68. UNALAKLEET NATIONAL WILD RIVER
69. NOWITNA NATIONAL SCENIC RIVER
70. BEAVER CREEK NATIONAL WILD RIVER
71. BIRCH CREEK NATIONAL WILD RIVER
72. CHARLEY NATIONAL WILD RIVER
73. FORTYMILE NATIONAL WILD AND SCENIC RIVER
74. ANDREAFSKY NATIONAL WILD RIVER
75. KANEKTOK NATIONAL WILD RIVER
76. ALAGNAK NATIONAL WILD RIVER
77. BREMNER NATIONAL WILD RIVER
78. ANIAKCHAK NATIONAL WILD RIVER

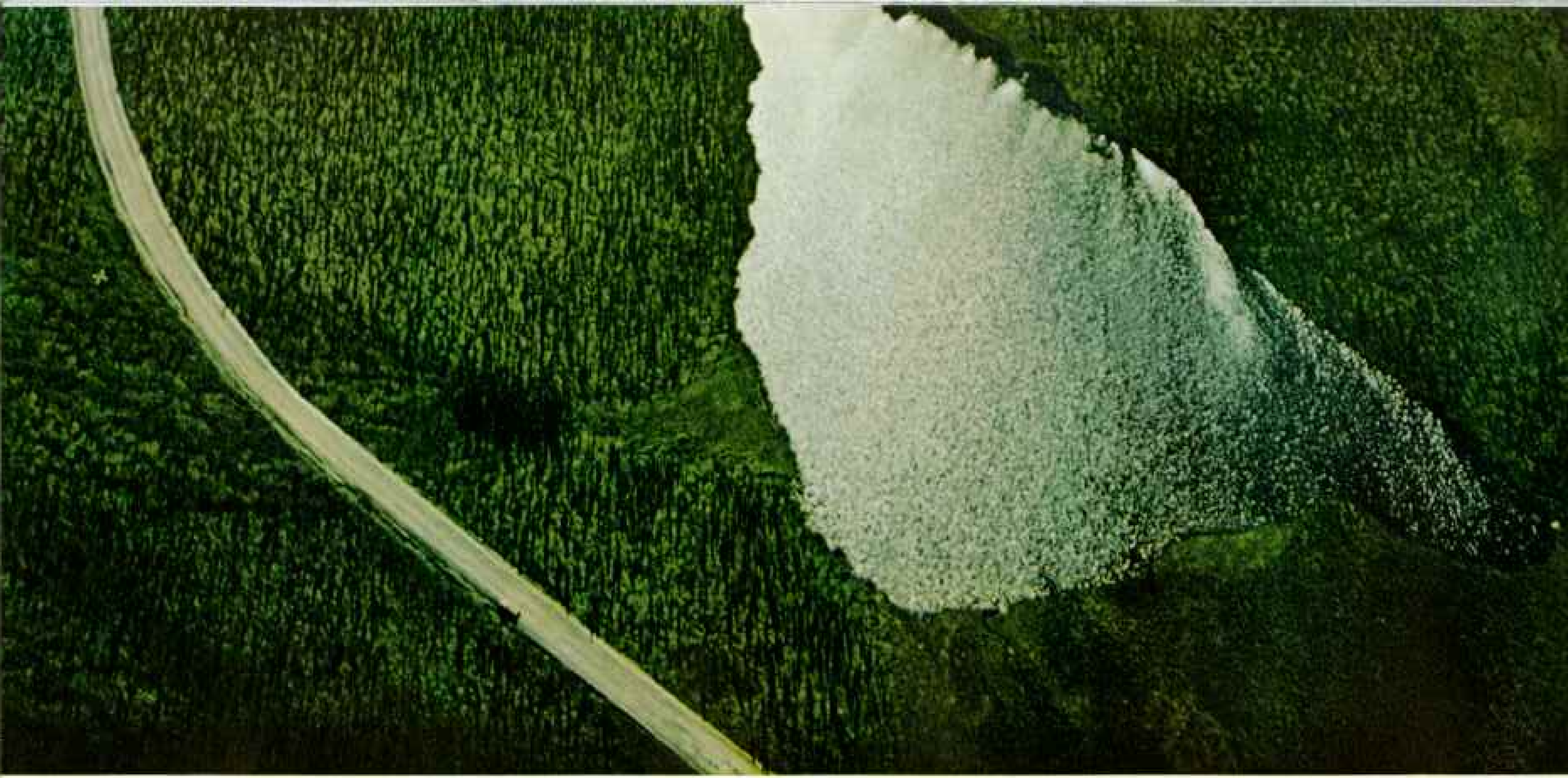
PIPELINE CORRIDOR

FEDERAL-CORRIDOR SEGMENTS ARE LINKED BY RIGHTS-OF-WAY THROUGH STATE AND OTHER LANDS.

LAND SUBJECT TO NATIVE SELECTION, PUBLIC DOMAIN RESERVED FOR FUTURE CLASSIFICATION, AND PRIVATE LAND.

Division of the land

TO EACH HIS OWN. Oil companies wanted to drill and pump. The state wanted land with exploitable resources. Conservationists wanted parks, wild lands, and refuges. And native groups wanted land and payment for giving up their claims. Those interests coincided in the claims act, and the state was then carved up with something for all. Though allotments are not final, the result makes Alaska the only state whose land use has been planned in advance of development.



Pipeline road: question mark across the Arctic

TWISTING SOUTH into the distance, along the Koyukuk River, the road roughly parallels the pipeline route. Through most of this stretch, and for about half of its full length, the line will be elevated to prevent thawing of the permafrost when full-capacity pumping sends two million barrels of crude oil at 130° to 145° F. through it daily. The integrity of the environment may be more threatened by people using the road than by possible oil leaks. Now reviewing all its transportation policies, the state could eventually permit public access, or deny it—or perhaps build a railway on the roadbed. If the road is ever opened to general use, traffic signs might have to read, NEXT GAS 360 MILES, or CAUTION: MOTORISTS FREEZE BEFORE BRIDGES.

some history," Homer said. "With dogs a man could go fifty miles out. Once I went to Barrow by myself in eight and a half hours with 11 dogs. With snow machines, a man can go fifty miles out and *back!*"

The Wainwright hunters had been out. Fred Ahmaogak and Billy Patkotek had brought in wolf and wolverine, and around the village there were half a dozen bloody polar bear hides stretched on frames.

The sight of those skins, rumored worth as much as $5,000 apiece in Japan, would anger many an Alaskan sport hunter and guide, for the Marine Mammal Protection Act of 1972 forbids him to hunt polar bear, walrus, seal, whale, or sea lion but permits the native to do so. The Eskimo, however, may not sell the whole skin, only traditional artifacts made from it. Many non-native Alaskans consider the act racially discriminatory, another example of dictatorship by a distant government, ignorant of the land and its people.

I CLIMBED INTO A WOODEN SLED, Homer hitched it to his "snow-go," and we roared off toward the immense lagoon that opens as wide as Kansas near the village. It was a stark and beautiful place, rimmed at the edge of sight with ridges of ice, the noon sun of winter burning like a giant copper caldron on the line of the horizon.

After a time, we came upon a group of people, almost all older folk, attending a crack in the ice, jigging lines with simple hooks at the ends and patiently storing small mounds of tiny smelts.

In the distance, I made out the white dome of a radar station. Homer squinted at it, too.

"The radar crews don't usually come over here to the village," Homer said.

"Why not? White men have been coming here for a long time," I said.

"Sure. My grandfather was from Boston," the Eskimo answered.

Homer remembered the name of a book his grandfather had written: *Chasing the Bowhead,* by Harston Hartlett Bodfish, published by the Harvard University Press.

"If you ever go Outside, you should visit the whaling museum in New Bedford. A lot of things of your people are there."

"Why are they there, in that Bedford? Why aren't they here where they belong? Maybe we should put up a white man's museum here at Wainwright someday, but then what would we put in it?"

THE FLAT ARCTIC DESERT of the North Slope rises southward to the 600-mile-long rampart of the Brooks Range, a huge maze of towering mountains and deep-cut valleys that straddles northern Alaska. South of the Brooks, the sweeping Yukon Valley dominates the interior with meandering rivers and spruce forest and tundra. Farther south the land rises in a magnificent arc of mountain chains—the Kuskokwim, the Alaska Range, the Wrangell, Chugach, and Coast Mountains—that terminates in southeast Alaska's fjords and islands. (See the map supplement, **"Close-Up U.S.A." —Alaska**, distributed with this issue.)

The size of the place is immense—a million acres for every day in the year: the North Slope Borough alone is larger than 40 of the 50 U.S. states—and Alaska's small population of 337,000 is clustered into the four main cities, making the rest of the state one of the least populated regions on earth.

But in a place of stupendous illusion, size is the most deceptive of all. A third of the state is above 2,000 feet in altitude. Only a fraction is useful for agriculture. Alaska lives from its mineral resources, from the bounty of its forests and oceans, and from little else.

"If you can't dig it, shoot it, or kiss it, what good is it?" goes a familiar question. What is causing a fracas is the answer conservation groups have been giving: "Look at it."

In exchange for their support in pushing through the land-claims act, conservationists won a provision that authorized the Secretary of the Interior to withdraw some eighty million acres from the public domain for possible inclusion in the "four systems"—new national parks, forests, wildlife refuges, and wild and scenic rivers. (See the portfolio of these proposed new parklands on pages 768-91.)

The scale and scope of some of the government's "four-systems" recommendations staggered many Alaskans. Most local conservationists, of course, want even greater protection for the acreage—and more acreage.

Among the highlights:

- Three massive new national parks: Gates of the Arctic, 8.4 million acres; Wrangell-St. Elias, 8.6 million acres; Lake Clark, 2.6 million acres.
- Four new national monuments: Aniakchak Caldera, Harding Icefield-Kenai Fjords, Cape Krusenstern, and Kobuk Valley—adding up to almost 3 million acres.
- Additions of more than 3 million acres to

Mount McKinley National Park, and almost 2 million acres to Katmai National Monument.

- Addition of more than 31 million acres to the National Wildlife Refuge System, including a large addition to the existing Arctic National Wildlife Range, a 3.6-million-acre refuge in the Yukon Flats, 7.6 million acres centered on the Noatak River basin, more than 5 million acres in the Yukon Delta, more than 4 million acres centered on the Koyukuk River.
- More than 18 million acres of national forest, the Yukon-Kuskokwim area being the largest, with significant forests set aside along the Porcupine River and in the Wrangells.
- Four major new wild rivers: Fortymile, Beaver Creek, Birch Creek, and Unalakleet.

Of all the blows that Alaska boosters had suffered, this one added insult to injury; not only was Uncle Sam giving the country back to the Indians, many complained, he was giving the rest of it away to the bears.

THERE ARE THOSE, like separatist Joe Vogler, who believe Alaska would be better off as an independent country. Mr. Vogler's cause appears lost from a practical point of view, but no Alaskan will refuse to listen to arguments like these:

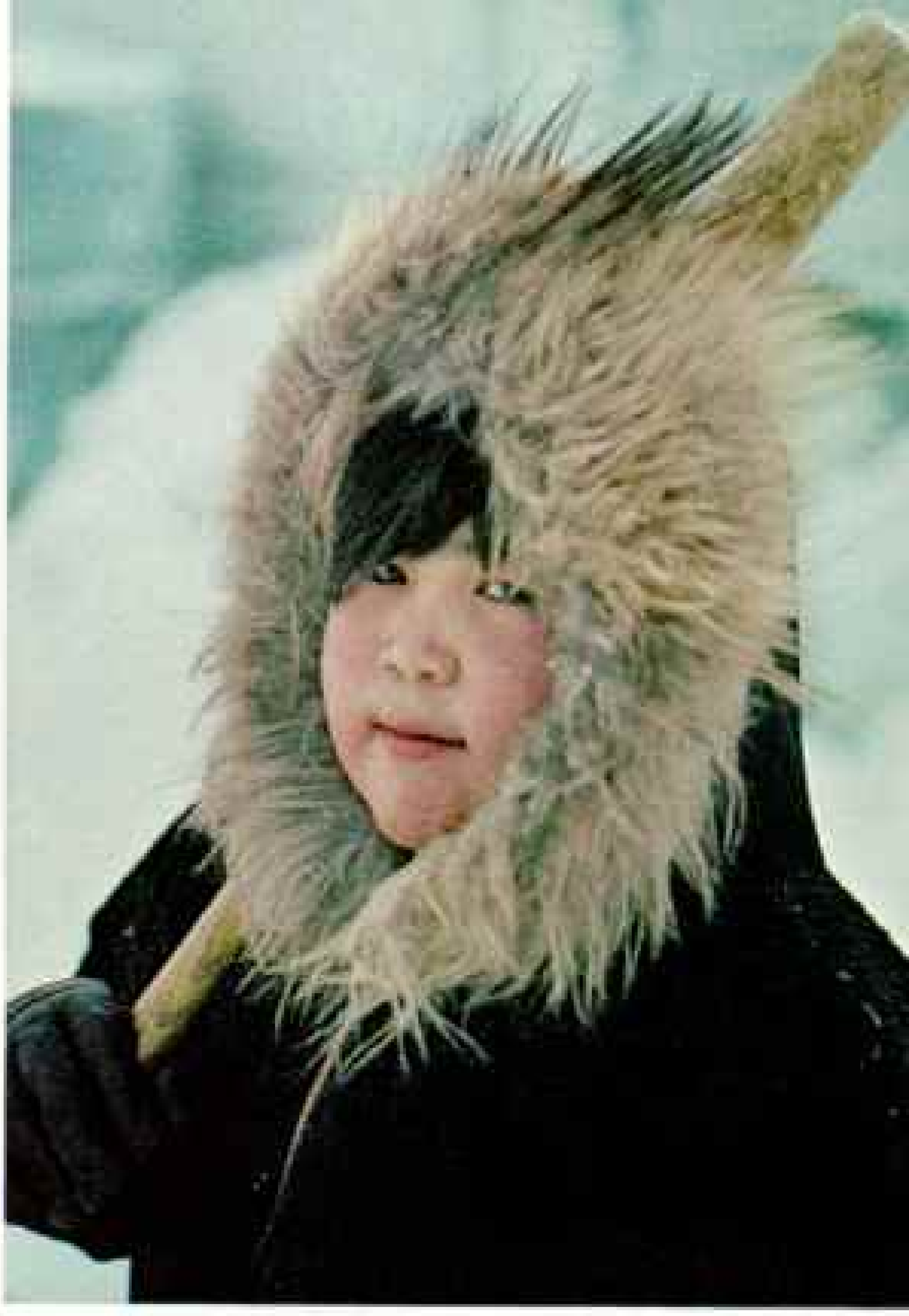
"Alaska has served as the typical colony," he told me. "Our wealth has always been exported to America, not distributed here. They tell our airlines where to fly, our fishermen where to fish. If we were selling our own oil to the world, we would be the Saudi Arabians of the north."

Alaskans have always fretted over the constraints imposed by U. S. ownership of much of the land; their battle with the "Feds" reached a memorable point with the late Senator Ernest Gruening's celebrated speech in which he compared the Federal Government to King George III, against whom the American Revolution was waged.

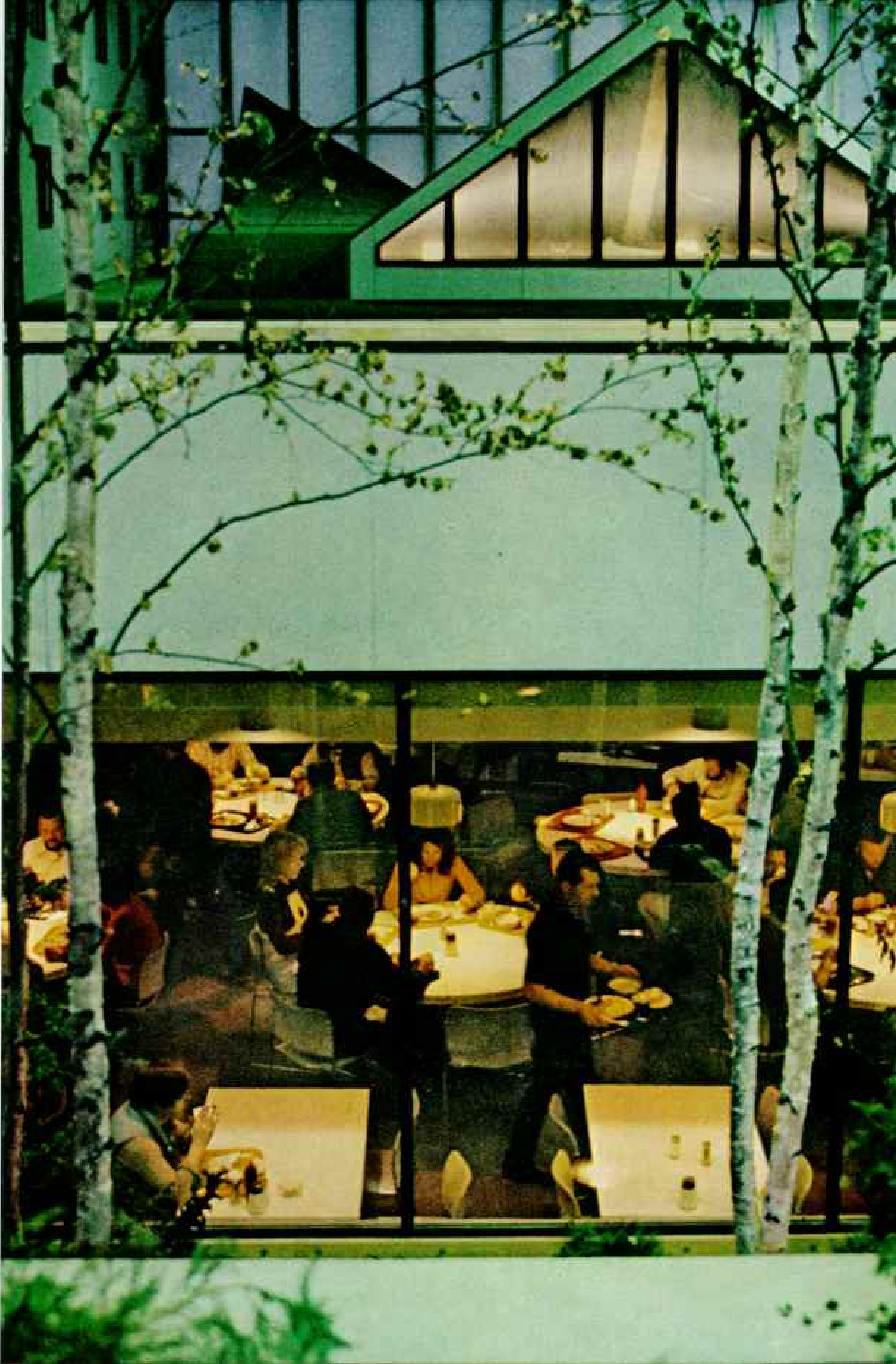
At the same time, Alaskans admit grudgingly that the government has also kept the state afloat for a long time, through large military expenditures and payrolls for agencies.

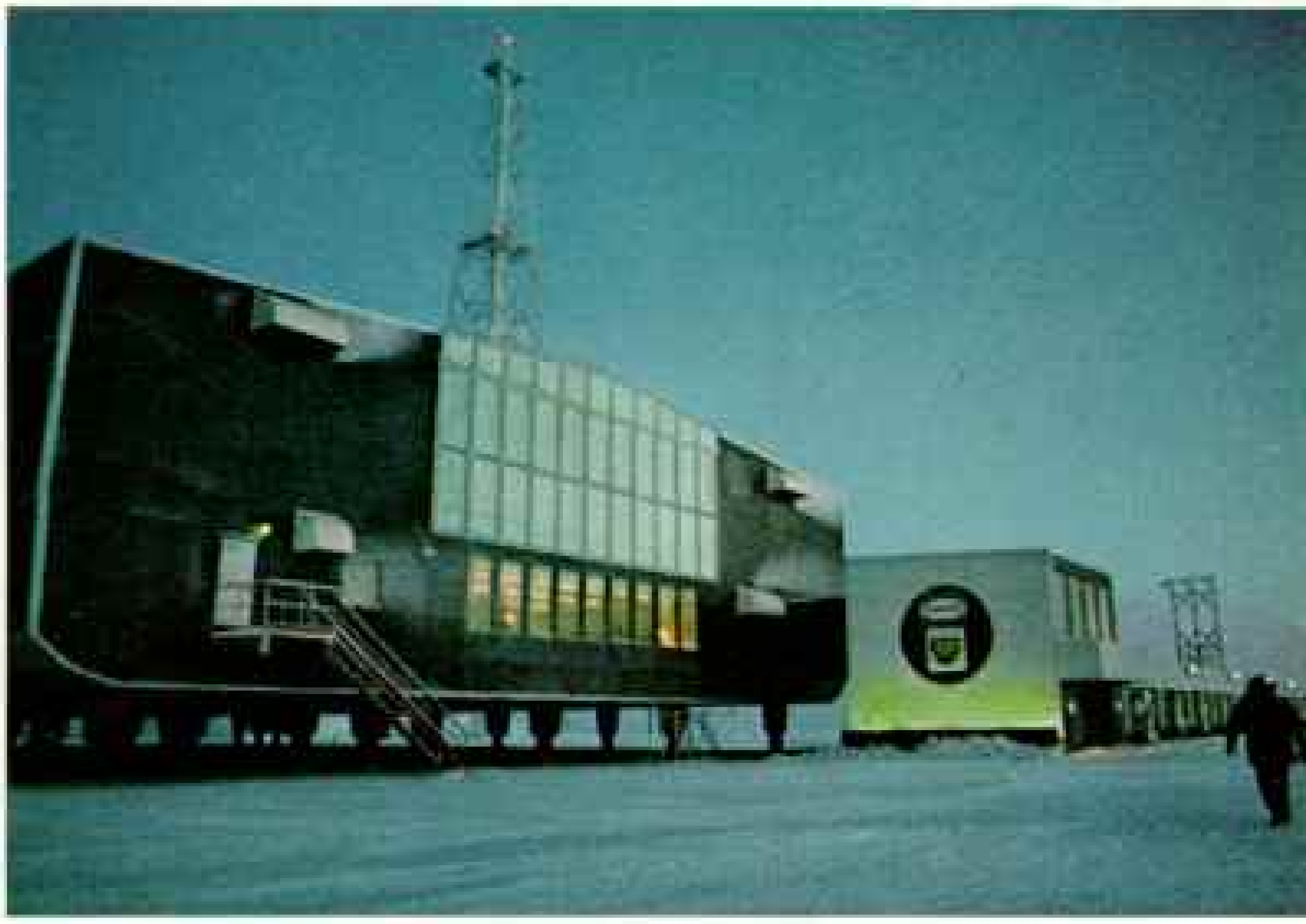
For many, then, government is an avowed but accepted irritant—but not so accepted are the conservation groups, especially those headquartered in the Lower Forty-Eight, that "suddenly" appeared on the Alaska scene, helped stop construction of the pipeline for four years, and began lobbying for huge tracts of land for wilderness and parks.

Those were dark days for conservation



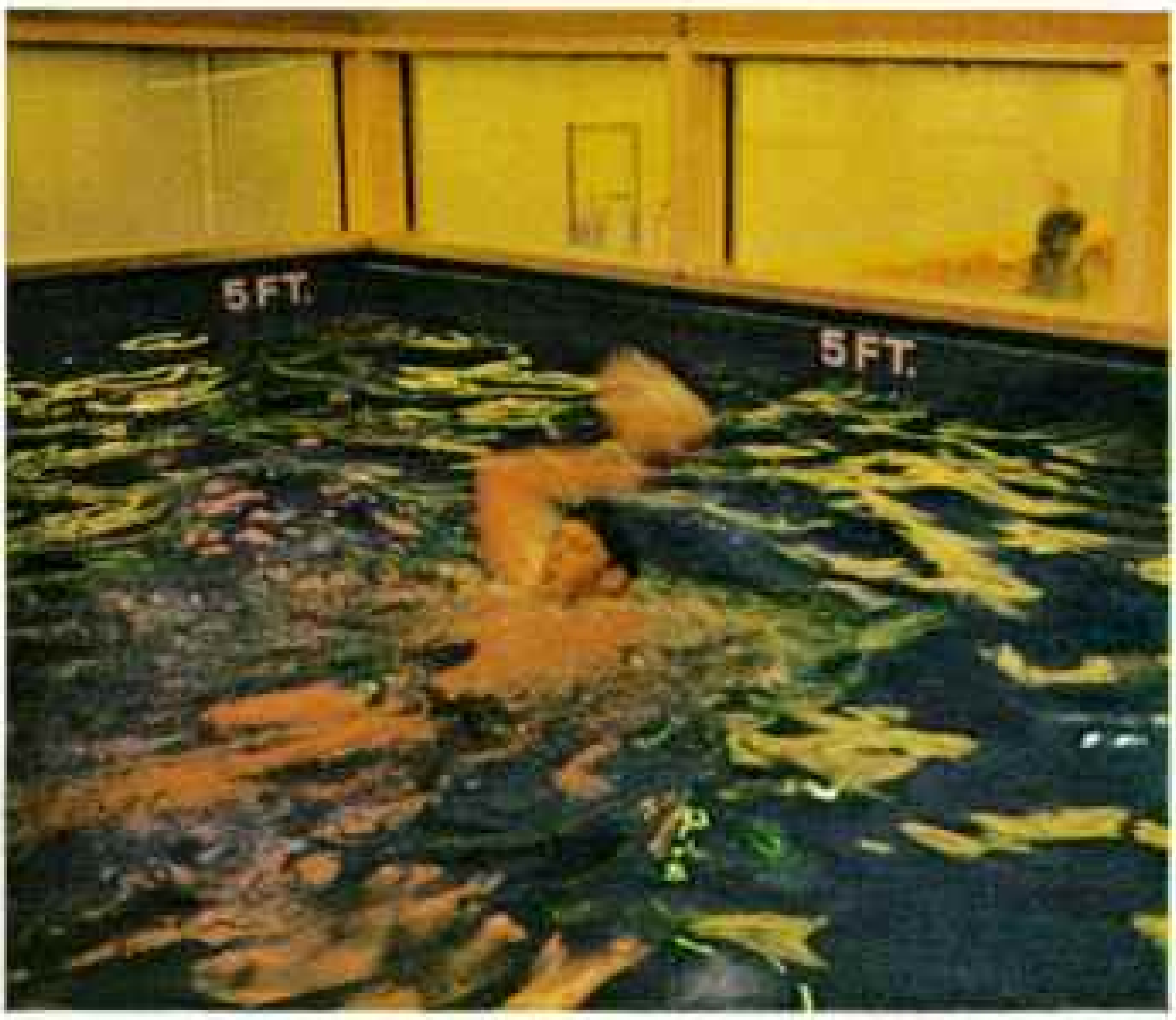
On deck at 30° below, Ben Simmonds waits his turn in a baseball game at Wainwright. His hood with a wolf ruff does double duty as a batting helmet. If fans had hot dogs, they would likely dip them in seal oil, not mustard. A frosted window cues the cheering section.





The house that oil built, BP/Sohio's operations center at Prudhoe Bay (**above,** left) sits atop insulated steel piers anchored in permafrost. Inside the structure, birch trees (**left**) go about their deciduous business, ready to drop their leaves in a thermostat autumn. Behind them, even-more-insulated employees sit down to steak and potatoes. To the trees and good food are added brightly colored interiors and recreation areas, including a swimming pool (**below**) that doubles as an emergency water supply.

All are designed to relieve the psychological stress of isolation in the high Arctic. BP employees earn a regular salary plus a bonus, and work every other week on a 12-hour, 7-day schedule. On their week off, they fly to Anchorage or Fairbanks at company expense. But in a state with chronic unemployment problems, the "No Help Wanted" sign is out all over. The message is: "Don't come to Alaska to live unless you already have a job."



leaders, and it was an appropriately dark winter day when I went to Fairbanks to talk to conservationist Dr. Robert Weeden, professor of wildlife management and Alaska's Policy Development and Planning director.

Young, handsome, articulate, with an acquired political savvy, Dr. Weeden had a far less pugnacious view of conservation matters than I had expected.

"The question before Alaska, to my mind," he said, "is what kind of society do we want to build here? Do we want what they have Outside, an industrialized society that makes maximum use of its salable resources, or a stable and more comfortable society interacting with our splendid environment?

"Like everyone else, we want to protect as much land as we can. The proposals have to be large. Outside of Alaska, there are just remnants and relics; here, though, we have entire ecosystems."

ONE SUCH ENTIRE SYSTEM is in the Brooks Range, where the Nunamiut, or inland Eskimo, has been living off wandering caribou for countless years.

The central Brooks was explored in the 1930's by the Forest Service's Robert Marshall, one of the fathers of the wilderness system. His marvelous accounts of explorations along the Koyukuk and other rivers drew the attention of conservationists and park officials

Midday dusk drifts over the rebuilt village of Nuiqsut, its Inupiat Eskimos secure in new houses after having survived a winter in tents. In 1973 they had come by sled and snowmobile 150 miles from Barrow to a spot near where the Colville River meets the

to this remote and stunningly beautiful region.

One of the National Park Service's proposed major additions is 8.4 million acres of the central Brooks Range, including the area Marshall called "Gates of the Arctic."

Last June, Park Service official John Kauffmann and guide-photographer Bob Waldrop led a small party up the Anaktuvuk River, then along Ernie Creek to its confluence with the North Fork of the Koyukuk, where I met them. We pitched tents beside a gravel bar.

It's a place that a man remembers for the architecture. The land rose sharply westward to Slatepile Mountain; southward the valley narrowed and passed between facing peaks that formed the Gates of the Arctic. Just above the camp stood Hanging Glacier Mountain, with its high apron of white.

I asked John over the campfire one evening whether 8½ million acres was not a very lot of land to be set aside for a single park. He drew on his pipe, stirred the beans, and explained that the proposal for Gates of the Arctic will be unlike any other national park proposal ever submitted to Congress.

"It would be run as a wilderness park, the last remaining place for a man who really wants to get away from it all. No roads. No development of any kind. Subsistence hunting by natives would be allowed. The protection of the land that comes with park status also would help protect a way of life.

Arctic Ocean. It had been, they said, a village years before, abandoned for lack of a school. Cold to the marrow in winter, a mosquito haven in summer, Nuiqsut has one major advantage: It lies between two of Alaska's proven oil and gas fields.

LAND CLAIMS MONEY
MONEY
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73 74 75
YEARS

Prime time means any time that people in Nuiqsut want to tune in a videotape player (**left**), here showing a program the Arctic Slope Regional Corporation produced to explain land-claims payments. No commercial broadcasts reach the village, and women in the store (**middle**), which stocks everything from children's skis to ammunition, wish they could get a newspaper less than two weeks old.

When the optometrist from the Public Health Service comes to town, 3-year-old Agnes Kasak (**right**) gets a chance to play peekaboo with herself in his mirror. The only connection with the world outside comes on twice-weekly flights, but the village clinic provides routine care.

With a "Yes, but . . ." gesture, Mayor David Brower (**below**) makes a point at a village corporation meeting. Nuiqsut's eligibility to claim Eskimo lands has finally been upheld; the corporation may now select as much as 115,200 acres, selections that will be influenced by the results of oil-and-gas exploration.

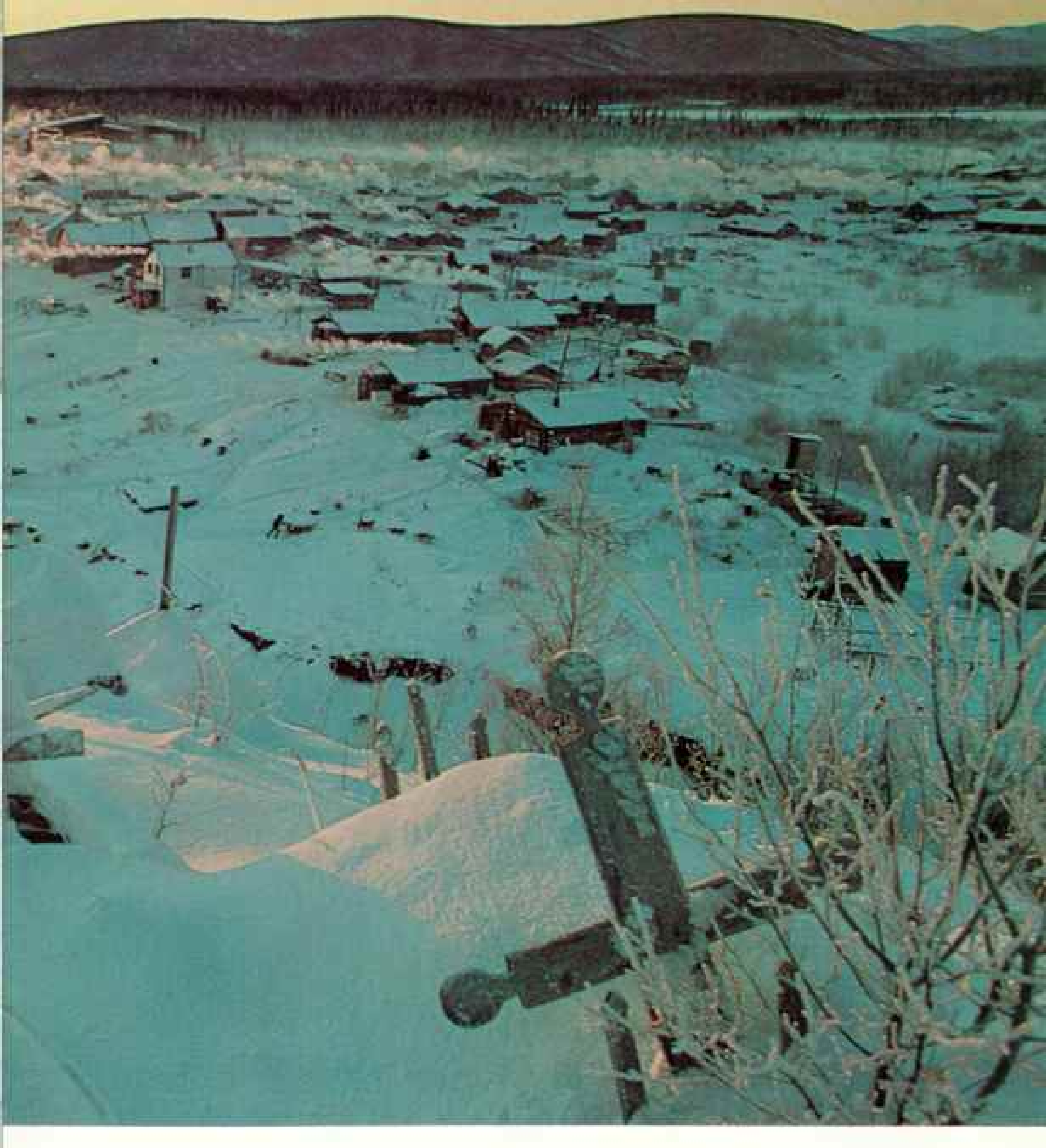
Hunting by others would be restricted. This park cannot be thought of, or operated, in the same way as a park Outside."

No one can predict how Congress will respond to the idea. Yet it takes very little imagination to foresee the impact of roads and trailer parks and concession hotels.

In the afternoon we walked up Ernie Creek to a small overlook; below us a moose and her calf stepped from the thickets and waded into the creek. A phalarope banked overhead, dropping down the wind toward an old beaver pond. Everywhere were signs of elemental life—the skull of a wolf, the remains of the carcass of a caribou.

But most of all there was silence, the kind that tells you that not even time is moving. A place for the human spirit to find itself.

IT WAS IMPOSSIBLE to imagine that in the next great valley to the east, the Dietrich Valley, the thunder of construction



was startling wildlife and the odor of camp garbage dumps was attracting bears as the world's most controversial road broached the mountains along the pipeline route.

I flew up along the route, through places like Prospect Creek and Coldfoot (named after a mining party had turned back) to the Alyeska Pipeline Service Company's Dietrich camp. The elevated gravel highway snaked its way north toward oil, a bright ribbon across the rolling wastes.

(Continued on page 758)

With memories as long as winter, the people of Nulato remember their dead. Each year they turn out for a day to repair and maintain the village cemetery, whose old crosses recall the first presence of white men along the Yukon. In week-long ceremonies, they also honor their Indian ancestors with the "stick dance." Settled in 1839 as a Russian trading post, Nulato was destroyed in 1851 in one of the few native uprisings in Alaskan history.

Whooping it up for the Wolves, Nulato school cheerleaders give it the old blue-, white-, and red-power chant for their basketball team. Nulato played an Eskimo team from Selawik. A grandmother there had warned against the Nulatos, "They have medicine men and maybe put a spell on you." Dark-shirted Selawik countered with headlock tactics (**above**), and the teams split two games.

The hoops and nets of basketball aren't the only ones that attract Nulato's students. Snaring, making fish-wheel traps, beadwork, and hide sewing are all part of a bicultural course of studies to teach the old skills to the young. The severe generation gap that had developed in native society is now beginning to close, as young leaders use the skills of the larger world with a growing pride in reviving the legacies of their cultural heritage.

Survival is a full-time job and a lifetime career for most of Nulato. Water comes in buckets (**above**), and in winter sewage goes out the same way. In their seasons, game, birds, and fish provide food. The forest gives fuel, and Michael Johnson (**left**) has a good load and a good team to take it home.

Sled teams are making a comeback after a time when the snowmobile threatened to do to the dog what the automobile did to the horse. If a snowmobile breaks down far from any village and starving becomes a possibility, you can't eat it.

Even taking in the wash becomes complicated when blue jeans freeze into a slab before they dry (**right**).

The basic life has basic compensations: a log house, well chinked, a hot fire, and moose stew bubbling on the stove.

No gravel road in history has cost more (it was running a million dollars a day at the time of my visit), or been more carefully studied and built. Construction was once shut down while Dall sheep were lambing in the Brooks; the route was altered to bypass one of the most northerly stands of spruce in Alaska.

It is what follows the roads that has people worried. Large mineral companies, like Bear Creek Mining, the exploration arm of Kennecott, have already rushed to land flanking the pipeline corridor and staked out claims, all looking for copper thought to exist in significant quantities across the whole southern flank of the Brooks.

As the road makes its way across Alaska, some communities welcome its promise of prosperity, and some others are fearful of its consequences.

The vital and controversial question of jobs—who is going to get them and how—was solved by the pipeline company through the project labor agreement negotiated with unions; in exchange for sacrificing the right to strike, the unions largely control employment, and wages are sky-high, as high as $1,500 a week.

While the intention has been to hire Alaskans first, and a certain proportion of the jobs are reserved for natives, one hears the accents of Texas and Oklahoma and other states of the Lower Forty-Eight more than often. Alaska Airlines has arranged a "Pipeline Special" flight connecting with Houston.

I stopped on a very warm day at Glennallen, where a State Employment Service trailer was surrounded by a group of men, all dressed in jeans, wearing knives on their belts, looking for work.

"All they had was two jobs," said one. "I'm going hunting."

Pete Ewan, an Ahtena Indian, had also just got the bad news. He came down the Employment Service trailer steps, wiping his forehead, disappointed at not getting a pipeline job. He offered to take me out to Dry Creek campground to show me something.

The land there has majesty. To the east rise the incredible Wrangell Mountains—Mount Drum standing huge and alone as their western sentinel, flanked by Mount Sanford and Mount Wrangell. From a spot named Kennicott on the southern flank of the Wrangells came a fortune in copper—a significant part of the $225,000,000 in copper extracted from the state since 1880 ($760,000,000 in gold was taken out in the same period). The huge mine is still there above McCarthy, a vast mausoleum of brick buildings.

We turned off the paved road and wound back on dirt to a gentle hill where several campers stood in the shade of spruce trees, barbecue grills at the ready. They were standing in Pete's wife's family cemetery. The graves were set off by picket fences, some of which had been broken up for firewood. This was once the village of Dry Creek.

Pete's wife, Annie, explained the historical accident that led to her misfortune:

"They had a big war there, down in Germany or somewhere. With the big war came soldiers, to build an airfield; they told us eight families to move. One house was burned down. We moved into a tent for two years and then down to Copper Center."

While they were gone, the state put up a campground and picnic tables near the spring.

Pete had hired a lawyer, and the matter was on its way to a court. In the meantime, the campers park next to the graves and the smoke from grilled hamburgers drifts past the double crosses that surmount the fence posts.

FOR MANY, "North to the Future" is a viable slogan, the clarion sound of the biggest and best boom yet. For many others, "North to the Past" is a more meaningful term. You see them everywhere, earnest young men and women in jeans, stomping into frozen Fairbanks from a cabin in the woods, sharing a strong belief that the old verities of independence and self-reliance can be found today only in a place like Alaska.

For them the Fairbanks bookstores display practical guides on cabin building and wilderness living. "Most of them go into the woods for a year or two and then go home," the book clerk told me. "A few, the good ones, stay, and they are the people who will make this state."

What keeps a lot of the younger people there is a conviction that what is Outside is worse. I got word one day that a young couple I liked, John and Susan Johnson, had bought a piece of ground down Turnagain Arm from Anchorage. I enlisted a friend and we put on our hiking boots and went to call on them.

We hoofed it 1,500 feet up the side of a mountain, following a moose trail, hallooing until our hosts hallooed back.

They had pitched a tent for a house, and a smaller one for a bedroom, and had been spending the better part of a week wrestling a stump out of the ground. A stump! On its side it stood almost ten feet tall, and its writhing roots opened in the clearing like a huge and malignant spider.

"I can't dynamite," John said, "because a cabin would later settle in the soft ground."

They slumped exhausted in the never-ending but chill twilight around a fire. It grew a bit murky around midnight, but soon brightened again, as did our spirits.

"The rest of the world," John said, "is really crazy. I wonder why people are willing to live like that."

John was lucky enough to be able to afford "roughing it." Many others are not, and lands available under the Homestead Act, by which Americans have taken possession of the public domain since Civil War days, were withdrawn by the government last year.

There is a point in the Alaskan experience when a person becomes an Alaskan—different from being an American. It may be when the joy he feels at going Outside is matched by the joy he feels at getting back. Becoming an Alaskan often involves unbecoming what you were; the divorce rate is high.

"Survivorship," said a frowzy blonde in the Big I bar. "Simple survivorship, that's what it's about up here. The pride you feel at having survived in such a place, but I'll tell you something—it comes at a price."

Those who have made the successful transition and been willing to pay the price to find a unique life-style have had the longest second thoughts about development.

"The whole thing, it's following me up here," said a young backpacker I met on his way to Mount McKinley. "I can hear it coming behind me—the hamburger stands and superhighways and office buildings! Where do we go from here—Siberia?"

Wildlife expert Bob Hinman spoke for a lot of Alaskans when, after the euphoria of the get-rich-quick oil boom, he regarded the prospects. "I'd rather the state stayed poor," he said, "and we kept what we had."

A biologist at the university, when asked about declining interest in the fate of the caribou affected by the pipeline,* shrugged: "People don't talk so much about caribou anymore because they have realized that the species most endangered by oil development is man. The quality of life in Fairbanks is already deteriorating. Crime, crowded schools, enormous rents, traffic, the lot."

FOR THIS KIND OF ALASKAN, a new kind of populist politician has risen—one in the figure of Jay Hammond, a professional pilot and guide who was elected governor last November.

"People's attitudes are changing," Governor Hammond told me. "Ten years ago most rural Alaskans were petitioning for roads to tie them to the urban areas. Now much of rural Alaska is petitioning *not* to be tied into the system. In the past we attempted to maximize development in the belief that all growth was good. Now, we try to scrutinize development in advance to see if benefits outweigh the costs. If they don't, such development is hardly healthy. Down where I live, on Bristol Bay, after years of extracting millions of dollars of our fishing resources, all we have to show for it is a rural slum."

Mr. Hammond won by the narrowest of margins, and opinions about future development seem about that closely divided in the state at large. It has come a long way back from the disastrous earthquake of 1964; Anchorage's wave of housing sweeps against the foot of the Chugach Mountains like a northern Los Angeles (following pages).

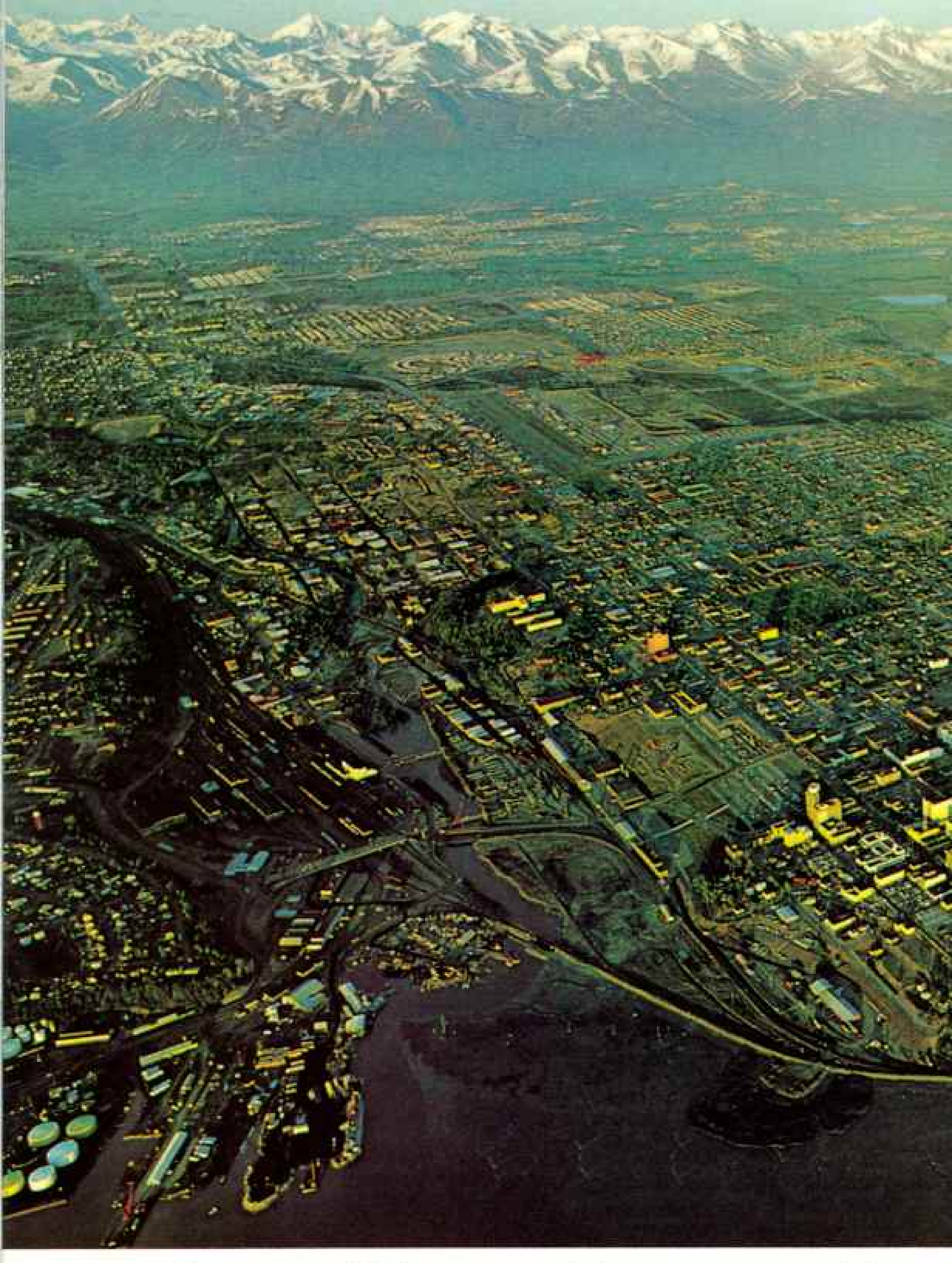
I stopped one day to chat with Walter Hickel, former governor and Secretary of the Interior during the first years of the bitter pipeline controversy. He went to a window and pointed to the Captain Cook Hotel, one of Anchorage's two modern skyscraper hotels.

"I built that place," Mr. Hickel said with emphasis, "right after the '64 earthquake. I did it because I wanted to show people that they had reason for hope and courage, that we were going to keep going."

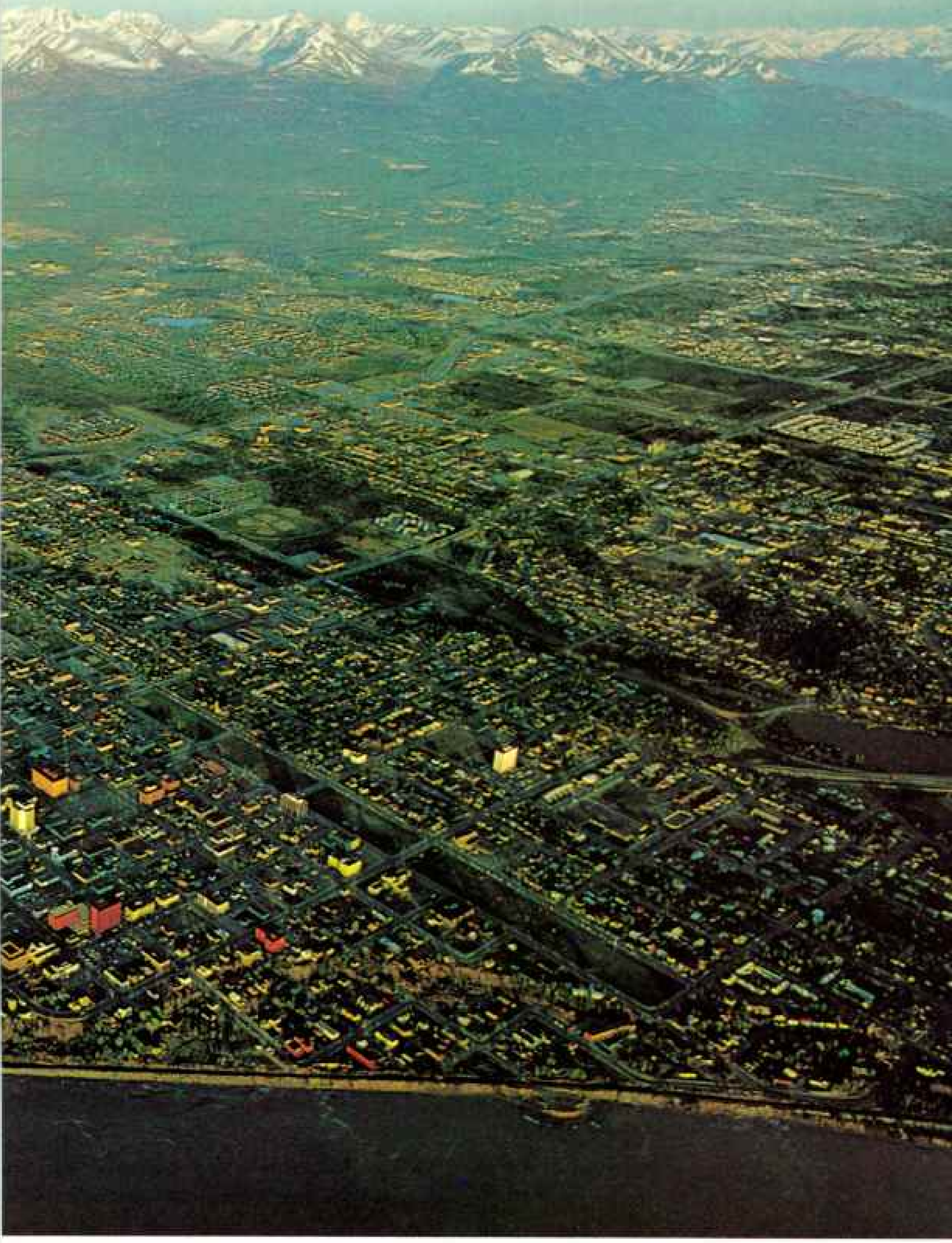
In the same spirit, Hickel had pushed his controversial "Ice Highway" through Anaktuvuk Pass to bring drilling supplies to the oil fields. Mr. Hickel, with Elmer Rasmuson of the National Bank of Alaska, Robert Atwood of the *Anchorage Daily Times*, and others, represents the old boomer spirit in its modern form. It is the spirit that has achieved much and, supported by oil revenues, will probably achieve a lot more.

JUST AS CERTAINLY as a new Alaska will be emerging in the years now at hand, so an old Alaska is passing from view. It was inhabited by men like Johnny Frank

*This problem was discussed in "Caribou: Hardy Nomads of the North," by Jim Rearden, NATIONAL GEOGRAPHIC, December 1974.



Nearly every second Alaskan—some 145,000—lives in greater Anchorage, between Cook Inlet and the Chugach Mountains. Fully recovered from the demolishing earthquake of Good Friday, 1964, it has become a headquarters city for corporations and government



agencies. With the sweet sprawl of success reminiscent of any growing city in the Lower Forty-Eight, Anchorage seems a world removed from deep-woods Alaska. Yet that is only a bush flight away, and many take off for it with all the unconcern of a Sunday drive.

(pages 730-31), whose cabin along the Chandalar River, at a place called Gold Camp, seems the last outpost of a receding civilization.

Johnny, an Athapaskan Indian, is 95 years old; he and his aged wife live alone. His cabin overlooks a winding curve of the river. When my plane landed on the river ice, it skidded a mark like a long letter C.

I hurried inside to the warmth of a small stove made from an oil drum; each time the creaking door opened, a cloud of fog swept in. Just after nightfall the outside thermometer was reading minus 58° F.

Through the long and cold night, we talked of ancient things. Johnny's leathery face was usually creased by a smile, except when memory would cast a certain sadness. He remembers: "Kobuk, the Eskimo, was bad. He killed many Indians. The shaman made big magic and stopped the wars."

Johnny remembers, too, a starving time among the Indians. "Lots of people," he said, "they got no animal, got no grub. A hundred people to die, too. Well, a man went to the medicine man and he say, lots of kids too much hungry, you make medicine for caribou. This man, Sagwenchaki, said, 'Make a big fire.' Well, people make 'em fire. He walk inside the fire. By-em-by he go in the snow. Two, three times he sing, go in the fire, snow. Caribou, his body, right there! He shake off some snow, he hold up his horn. He tell 'em where caribou are. Then into fire again and come out a man again."

We talked about the oil pipeline, which Johnny had heard about. "Oil people, too many different brain, too many big shot. I lived a hard life, number one, but kept on, and kept on, and kept on, and I'm all right. People are too crazy in the heart for money."

Toward midnight, I walked onto the frozen Chandalar River to watch a spellbinding performance of the aurora borealis (pages 732-3). The word glory kept coming to mind, the kind of glory that one would imagine is meant by a Christmas carol in describing the sky over Bethlehem, a burning bright. It was not a light that shone but a light that was—diffused through the dark reaches of space, shimmering there—like the signature a painter puts in the corner of his work.

THOSE who have not experienced the vast emptiness of Alaska think of it as a great wilderness teeming with wildlife. Actually, Alaska is a very stark and poor region; there are large numbers of animals only because this environment is spread over such a large space. What seems clear to the wildlife experts is that development of the sort we are familiar with in the Lower Forty-Eight would punch gaping holes in this fragile web of life, and the numbers would disappear.

The men who have made a living from trapping in the wilderness also know a change is coming, and do not care for the prospect.

Fairbanks was in the grip of its usual ice fog the morning I went over to see Fabian

Carey. It was 48° below, and automobiles were emitting groans and metallic shrieks as they klunked about the streets, struggling to rise from the frozen flat spots that had developed in the tires during the night.

For the better part of thirty years, Fabian—a tall, broad-of-shoulder, slightly grizzled, square-jawed, and independent man—has trapped in the wilds, but now he was in town, newly elected head of a new organization, the Interior Alaska Trappers Association.

"We finally decided we had better organize," Fabian said. "I see what's happening in this state, and it's like watching a storm coming. First the statehood act, then this oil push. When I think of the cruelties that have been visited upon Alaska! What is happening here amounts to entombment of the land. It's happened before, on the Outside, and the result is that the public domain tends to vanish."

Fabian has a faceless enemy: "Massman." He has a long list of things that Massman does not understand, but the central one is that the acquisition of things is meaningless, even demeaning, to human life.

"We suffer, because Massman can't get it through his head that no one ever *owns* anything. We only use things for the little time we are here. The only thing a man owns is his life."

I STOOD ONE EVENING with a friend on the slope of the Chugach Mountains behind Anchorage, looking out over Cook Inlet, where distant gas flares rippled. Far below us the city spread a wide pool of light.

"You are looking," my friend said, "at almost half of the people in Alaska."

White man's Alaska is Anchorage and Fairbanks—modern, urban, civic Alaska developing in the form of Seattle or Chicago. Some 70 percent of the white population of the state can be found in those two places.

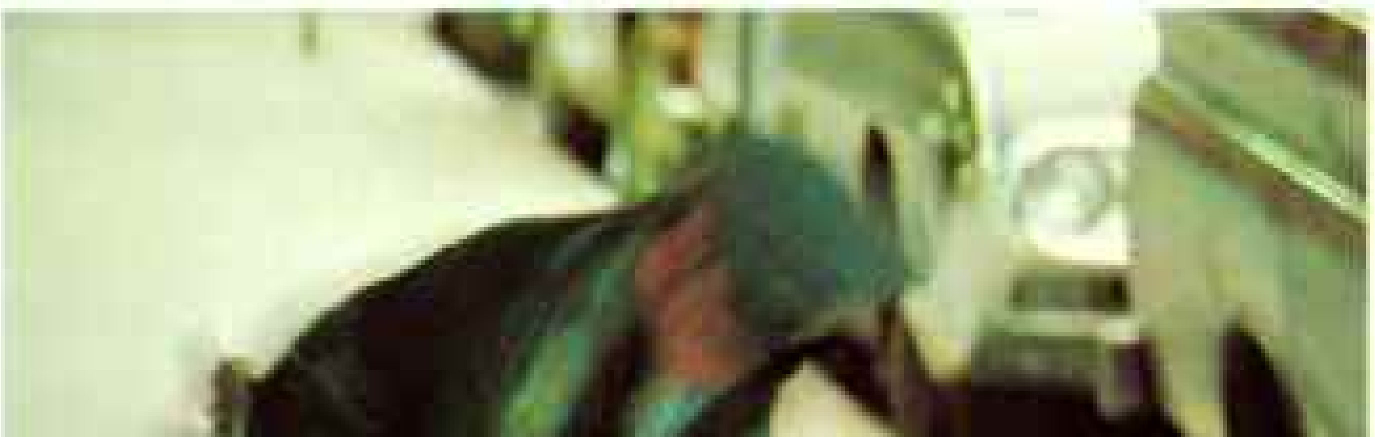
The other Alaskans—Eskimos, Indians, and Aleuts—number about 60,000 people, and they are widely scattered across half a million square miles of virtual wilderness, in small villages where killing an animal is still a means of existence.

The dichotomy between the two Alaskas is enormous. After a century that saw the advent of white man's education, medical care, transportation, government relief, and welfare payments, the Federal Field Committee for Development Planning in Alaska reported, in 1968, that the prevailing conditions of native life were "appallingly low income and standard of living, and the virtual absence of opportunity. . . . most of them live in poverty. . . . in small, dilapidated or substandard houses. . . . often victims of disease, and their life span is much shorter than that of other Alaskans."

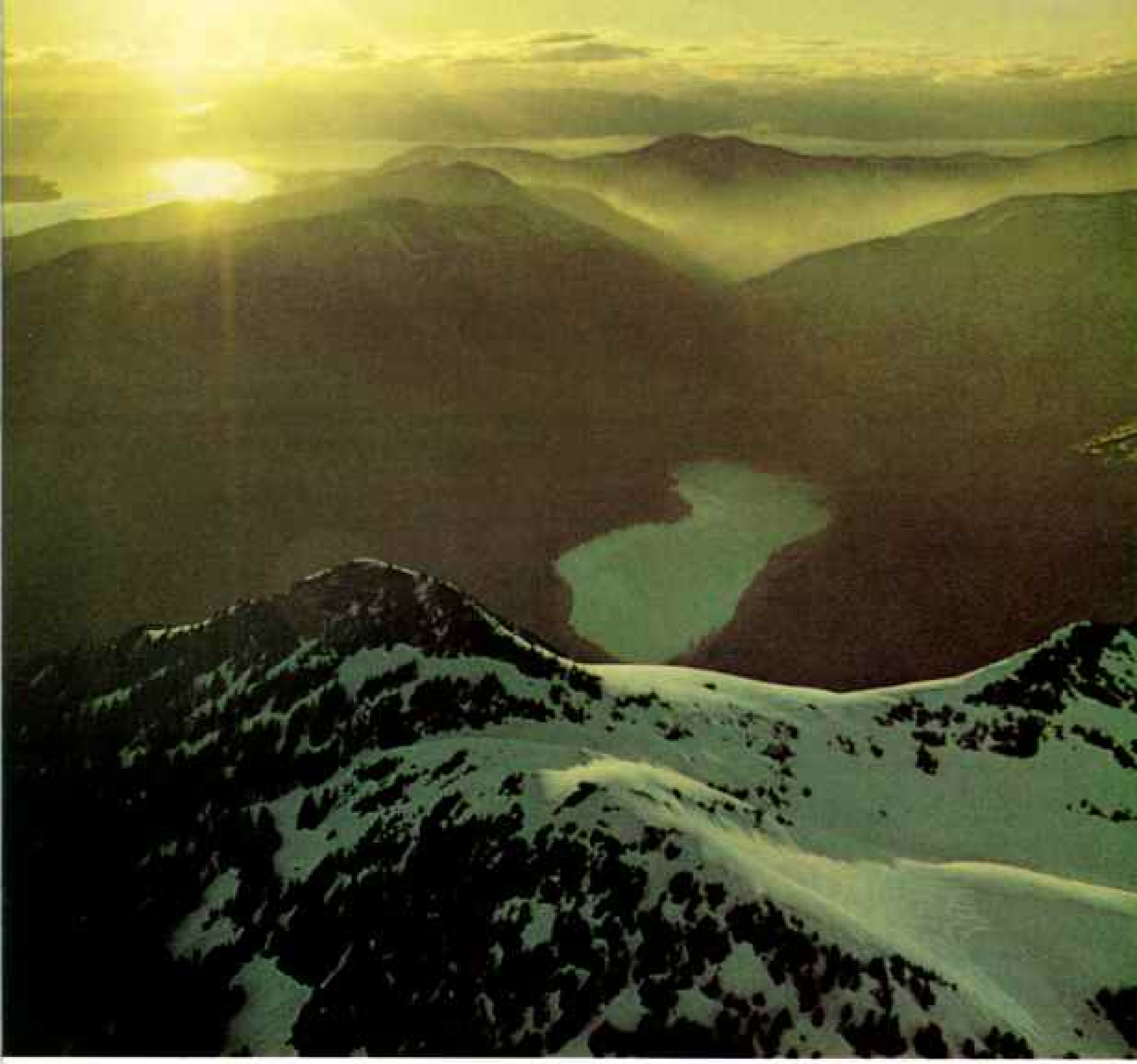
At the same time, Alaska's native population is growing almost twice as fast as that of the United States as a whole—at a rate of about 20 per thousand annually, roughly comparable to the rate for East Asian countries. A surprising number, 75 percent, of

Paying to rough it, Susan and John Johnson (**right**) came to Alaska after homesteads and other free land had run out. They bought eight expensive acres of wilderness with a view, tenting while they built a small, handsome log house with no modern conveniences. Jeeping in and out of Anchorage, 21 miles away, they enjoy the best of both worlds.

Natives can select free land, but around Cook Inlet most of the good acreage is gone. Regional corporation official Larry M. Oskolkoff (**left**) points to territory in the Kenai National Moose Range that natives want to trade for, giving up what they have in glaciers.



When day turns in, trouble may turn out in Ketchikan, in the far southeast. Resisting arrest, an Indian girl struggles with an officer subduing her for a liquor violation (**left**). High alcoholism, suicide, and homicide rates have long plagued natives cut loose from traditional village life. William H. Seward, whose "folly" Alaska was, sympathized in 1869, saying, "... we shall cease to regard them as indolent or incapable; and we shall more deeply regret than ever before that a people so gifted by nature, so vigorous and energetic ... can neither be preserved as a distinct social community nor incorporated into our society."



the natives are younger than 35 years of age.

For an entire generation of young native Alaskans, there is no going back. Taken from their villages at an early age by the Bureau of Indian Affairs and sent away to school, they are stranded by their education; there is very little for them to do in the village if and when they return, and little opportunity outside it.

IN ITS ever-dark and frozen winter, a native Alaska living on welfare payments and liquor can be an angry and dangerous place, with deep psychological problems. Proportionately, twice as many natives now die of accident, suicide, and homicide as died in 1950, and five times as many of alcoholism.

The small city of Bethel, for example, is a long way from Kodachrome Alaska. For some unknown years it had been a fish camp along the Kuskokwim; then in 1885 Moravian missionaries renamed it Bethel and taught the people to throw away their ritual masks and their worship of spirits.

Life has never been simple there, on the immense tundra, in the chinook wind; it hung precariously on the luck of the hunt and the summer runs of dog salmon. Now life is more certain, and more complicated, adorned by a large hospital, school, landing strip, and all the woes of social change.

Social worker Sam Dinsmore spoke of the unrest of the youth: "The generation gap here, as it is all over Alaska, is profound and probably unbridgeable. It represents ways of life that are not years but millenniums apart."

The native corporation, Calista, counts 56 villages in its corporate limits, by far the most in any corporation. George John told of the problems he faced in explaining the work of Calista to the villagers:

"Take Lime Village. It is nothing more than a family that decided to make a start on their own, wandered around and got lost. There are four or five houses. Maybe somebody speaks English and maybe nobody does. How can I fly in there and explain what a board of directors is?"

In places like Bethel one meets haunting figures like Robert Gibson, a gaunt man who taught many native leaders as children. "The old way has gone," he told me. "The self-sufficient, hunting Eskimo has breathed his last. The culture has been assaulted and destroyed. Now we have something else, an emerging racial consciousness, a generation that looks at its own history and is outraged."

FOR ALMOST A CENTURY the way to Alaska from the Lower Forty-Eight was a waterway, a passage through the mountainous, forested islands of the Alexander Archipelago.

This immense green-and-blue world of channels, fjords, inlets, passages, coves, bays, and straits looks as though it has just emerged dripping wet from the first separation of the waters at creation; in fact, it has only recently been freed from the embrace of glaciers that have withdrawn to the brooding heights of the mainland ranges.

Mild temperatures and heavy rainfall (an average of 150 inches at Ketchikan) have created here a vast and valuable rain forest of western hemlock, Sitka spruce, yellow and western red cedar, lodgepole pine, and alder. It was inevitable that the western progress of the timber industry would eventually bring it to southeast Alaska, almost all of which is included in the nation's largest national forest, the Tongass.

For years the Forest Service has doled out timber to sawmills and pulp companies, but now Tlingit and Haida Indian villages are going to select some prime timberlands under the land-claims act. They have already received 7½ million dollars as the result of a lawsuit brought nearly 40 years ago.

The southeast offers a weary modern man a chance to get about as far away from it all as a man can get, in places like Wilson Lake, an alpine wilderness lake that seemed more like a fjord.

I spent three days there. The muted music of this wet green world gradually became audible to ears numbed by jet planes, city traffic, and blaring television sets: the crack of the kindling in the small stove, the whisper of raindrops across the surface of the lake, the rush of the streams out of the high country above me.

In new-found serenity I walked out through the forest, across a carpet of moss, in the shadow of great trees that all seemed grandfatherly. A stream came through the place, loud as a brass band during its long plunge from on high, but instantly smoothed and mellowed and made chimes of by the pebbly stony bed of its passage through the fern-shaped shadows of the lower forest.

All questions cross one another in life. Should a magnificent wilderness like this be sullied by man's economic use, the forest cut out, the trees snaked away and sawed up to make houses and hamburger stands? But to enjoy such a place, I had arrived in a plane.

IN THE BARS AND SALOONS that many Alaskans call home during the long winter months, one hears the usual medley of popular songs. I like especially one sung by Cat Stevens, a kind of poem of praise to the world as one finds it:*

Morning has broken
Like the first morning
Blackbird has spoken
Like the first bird
Praise for the singing
Praise for the morning. . . .

It may be true. It may be true that in Alaska a democratic society will redeem its old errors and mistakes in regard to the treatment of minority peoples, to respect for the land, to equal and open opportunity under a regime of responsibility. In many ways, it is America's first chance, and in many other ways, it is her last. ☐

Caution, openness, and resolve stand foursquare with three generations of Eskimos at Nunapitchuk. Natives and whites will need those qualities where they are going—a promising territory, but vast and uncertain. Call it the future. Call it Alaska.

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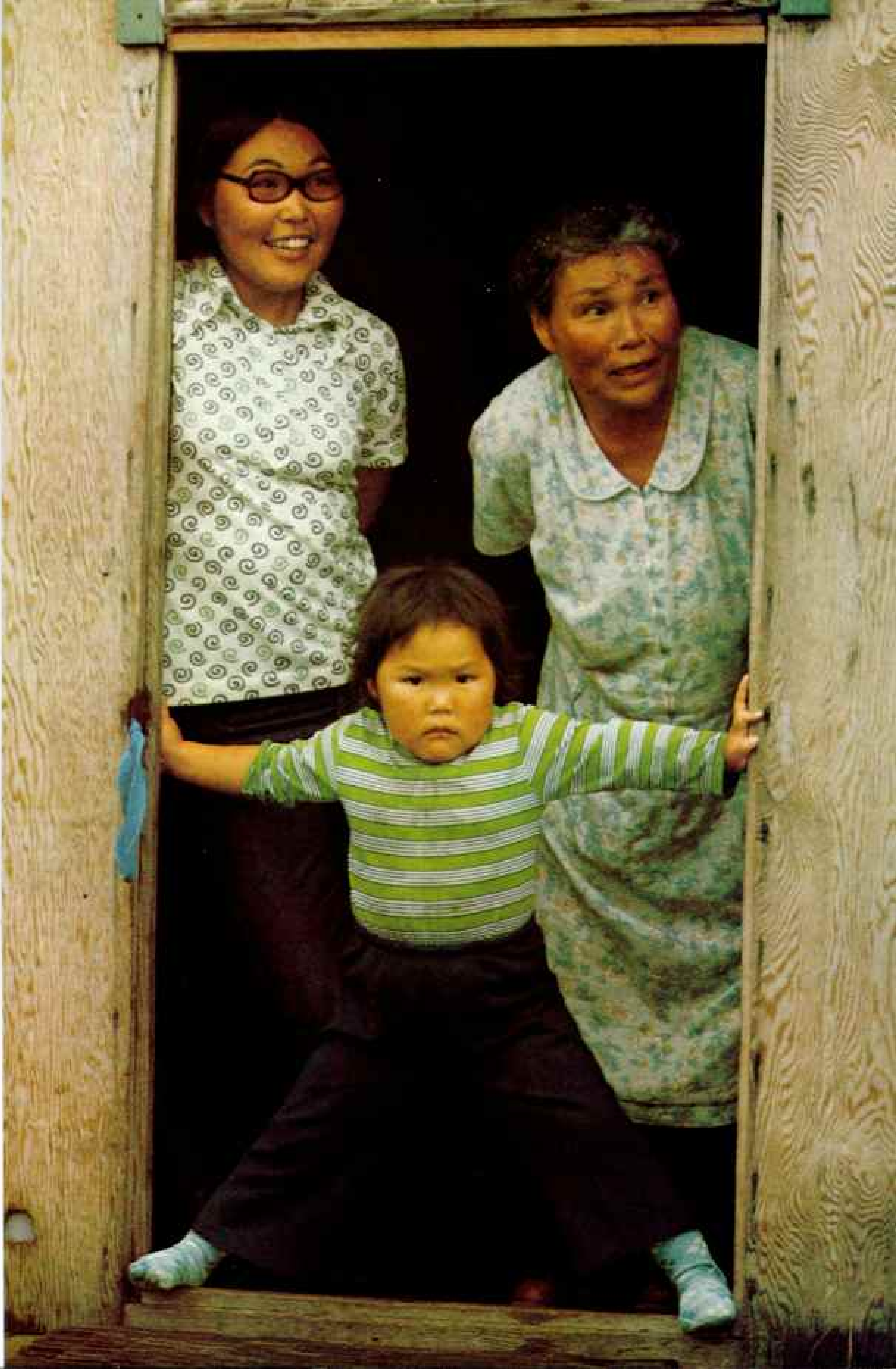


Preserving America's Last Great Wilderness

Text by DAVID JEFFERY
NATIONAL GEOGRAPHIC STAFF

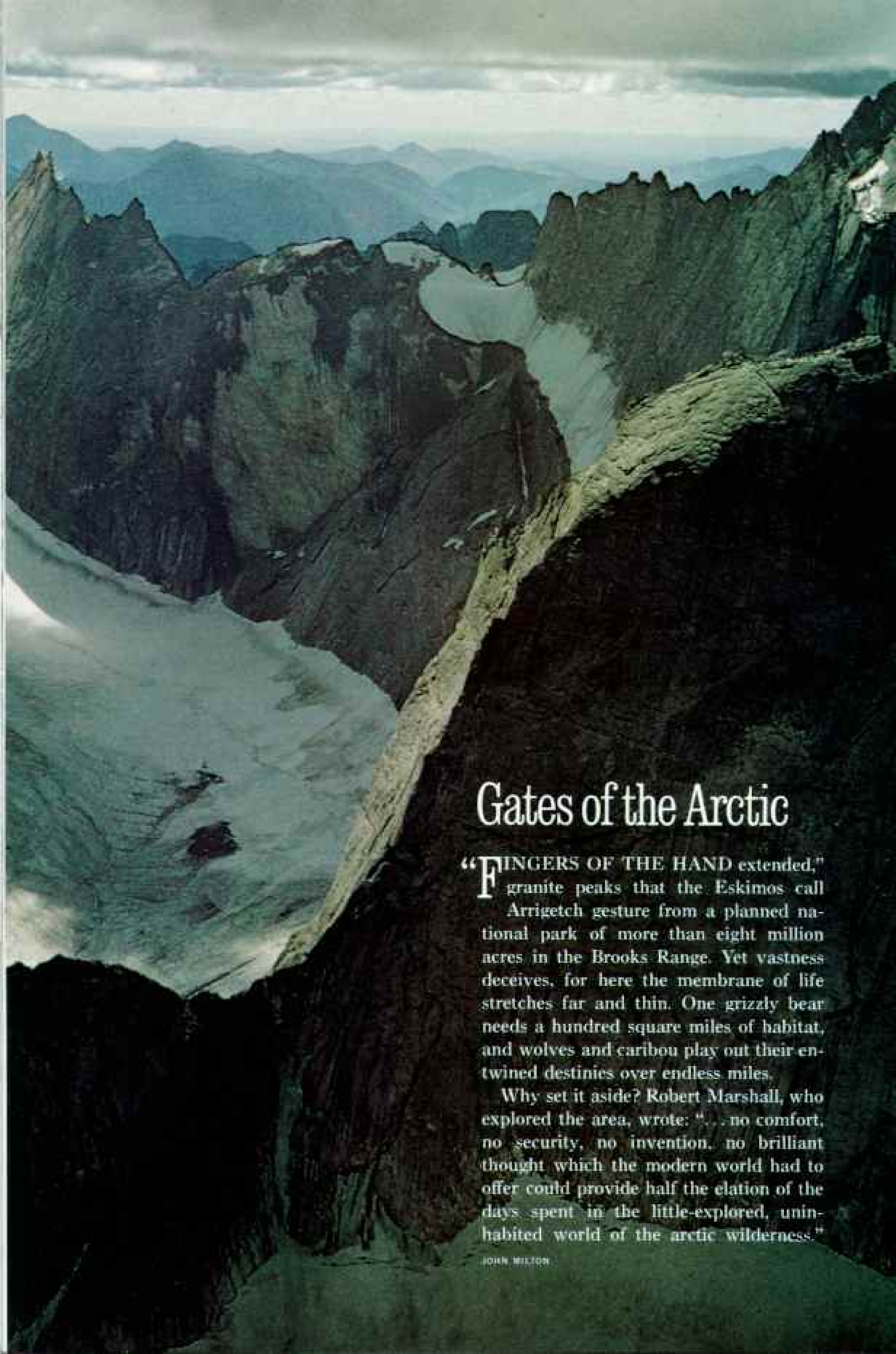
THEY FIT the enormous scale of Alaska, these largest of land carnivores. Shambling along a salmon-packed river, an Alaska brown bear and her cubs suggest all that is awesome yet vulnerable about the great land the Aleuts called *Alakshak*.

It has been proposed that some 80 million wilderness acres of that great land be set aside for posterity, 32 million acres under National Park Service jurisdiction—more than doubling the size of that system (map, pages 738-40). These new regions would include horizon-to-horizon wilderness, critical wildlife areas, important archeological sites, places where man can come for recreation, and places where man lives with the land as he always has. The 32 million acres would be divided into four new parks and additions to an existing park, four new monuments, a national reserve, and a national rivers area.

Park managers plan to permit subsistence hunting and fishing where established, to employ natives who know the land to interpret it, and, in the most primitive areas, to allow access only by footpower and floatplane.

Why compound Alaska's remoteness with wild parks and Spartan facilities? That same question arose in 1872 about the original Yellowstone proposal. It seemed then that the land would never run out. Fifteen Yellowstones' worth of wild Alaska seems a huge amount of virgin country. It is also the last.

ALLAN L. EGBERT



Gates of the Arctic

"FINGERS OF THE HAND extended," granite peaks that the Eskimos call Arrigetch gesture from a planned national park of more than eight million acres in the Brooks Range. Yet vastness deceives, for here the membrane of life stretches far and thin. One grizzly bear needs a hundred square miles of habitat, and wolves and caribou play out their entwined destinies over endless miles.

Why set it aside? Robert Marshall, who explored the area, wrote: "... no comfort, no security, no invention, no brilliant thought which the modern world had to offer could provide half the elation of the days spent in the little-explored, uninhabited world of the arctic wilderness."

JOHN MILTON

What man staked, nature claims

CYCLES OF BOOM AND BUST have swept Alaska like the summertimes of arctic plants (**facing page**)—bright splashes following seasons of desolation. Fur trade, whaling, and gold all had their day. In the proposed Yukon-Charley National Rivers area, cabins of trappers and miners stand empty in the woods. Through one of them (**below**) whispers a breeze of expectancy, as if the shade of some long-departed sourdough might come tromping through the door with another armload of stovewood.

ROBERT BELOUS, NATIONAL PARK SERVICE (ABOVE), AND BRUCE DALE

Such reminders of an era of high hopes would be preserved to complement some two million acres of forest and tundra, rivers and streams clean as creation, and a mosaic of wildlife that includes the endangered peregrine falcon. Recognizing the historic nature of the area, the Park Service would permit some traditional types of mining near the Yukon River, Alaska's first and greatest highway.

Still, contention over the use of Alaska's land continues. To some, it is the last great wilderness and must be safeguarded. To others, it is the last frontier, a storehouse of resources to open and exploit.

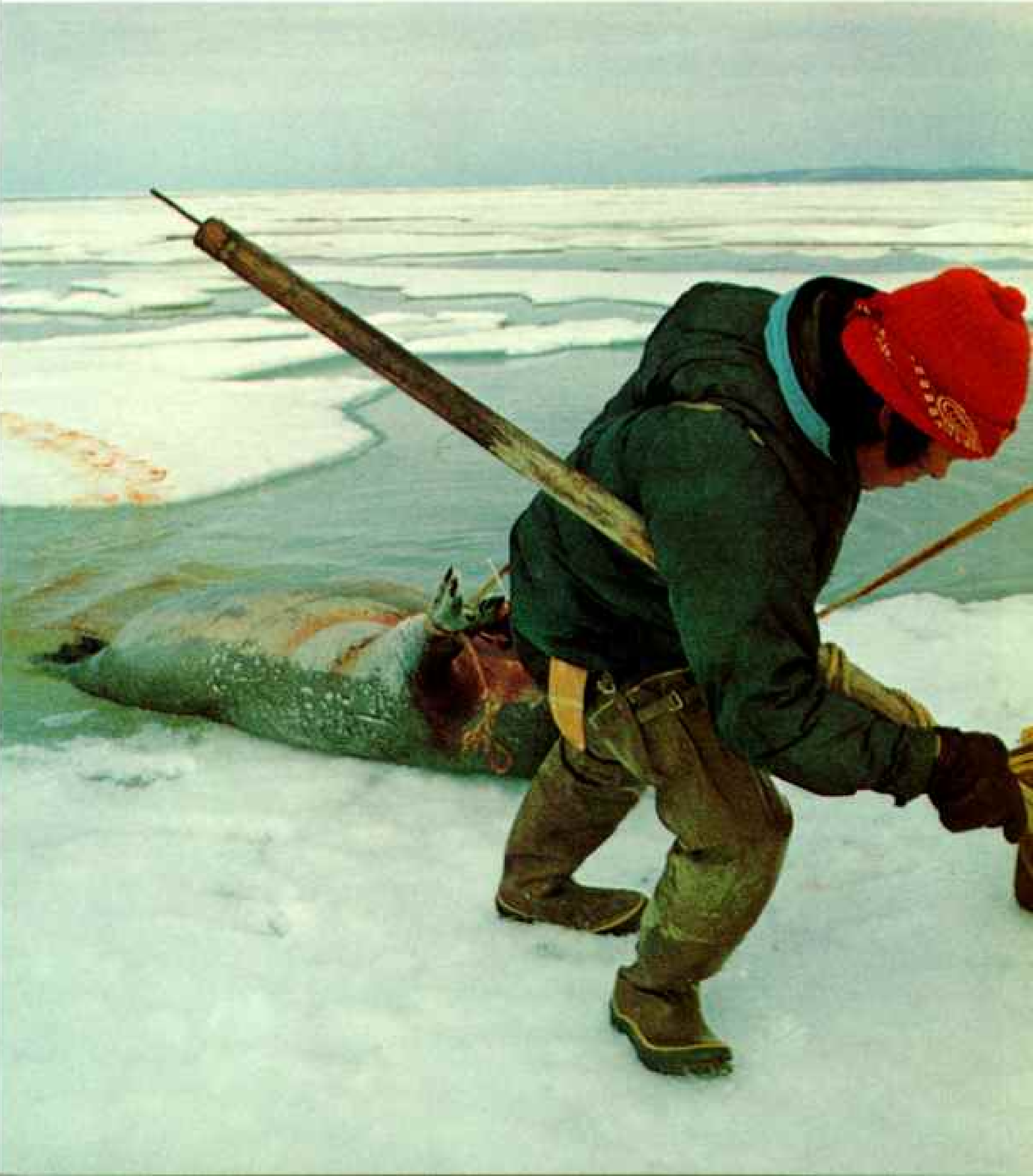
A resident of Eagle, over the eastern border of the Yukon-Charley region, doesn't want *anybody* meddling: "We should be free to use and enjoy the land. It has always been open . . . and it hasn't changed since I landed on the Yukon in 1933."

Under the terms of the Alaska Native Claims Settlement Act of 1971, the broad outline of Alaska's future was charted. So much will be allotted to the Eskimos, Indians, and Aleuts, so much for parks and other protected lands. Like it or not, the time of change is now at hand.

Where man takes only what he needs

THE HIGH-POWERED RIFLE retired the harpoon, and clothing no longer comes only from the kill, but the scene is as old as man in America. Wallace Williams struggles home with an *oogruk*, a 500-pound bearded seal. In the camouflage of his snow shirt, *kattikning*, he stalked the wary mammal, keeping low, always showing the same silhouette. If the first shot hadn't killed instantly, the oogruk would have dived, and escaped or drowned beneath the ice.

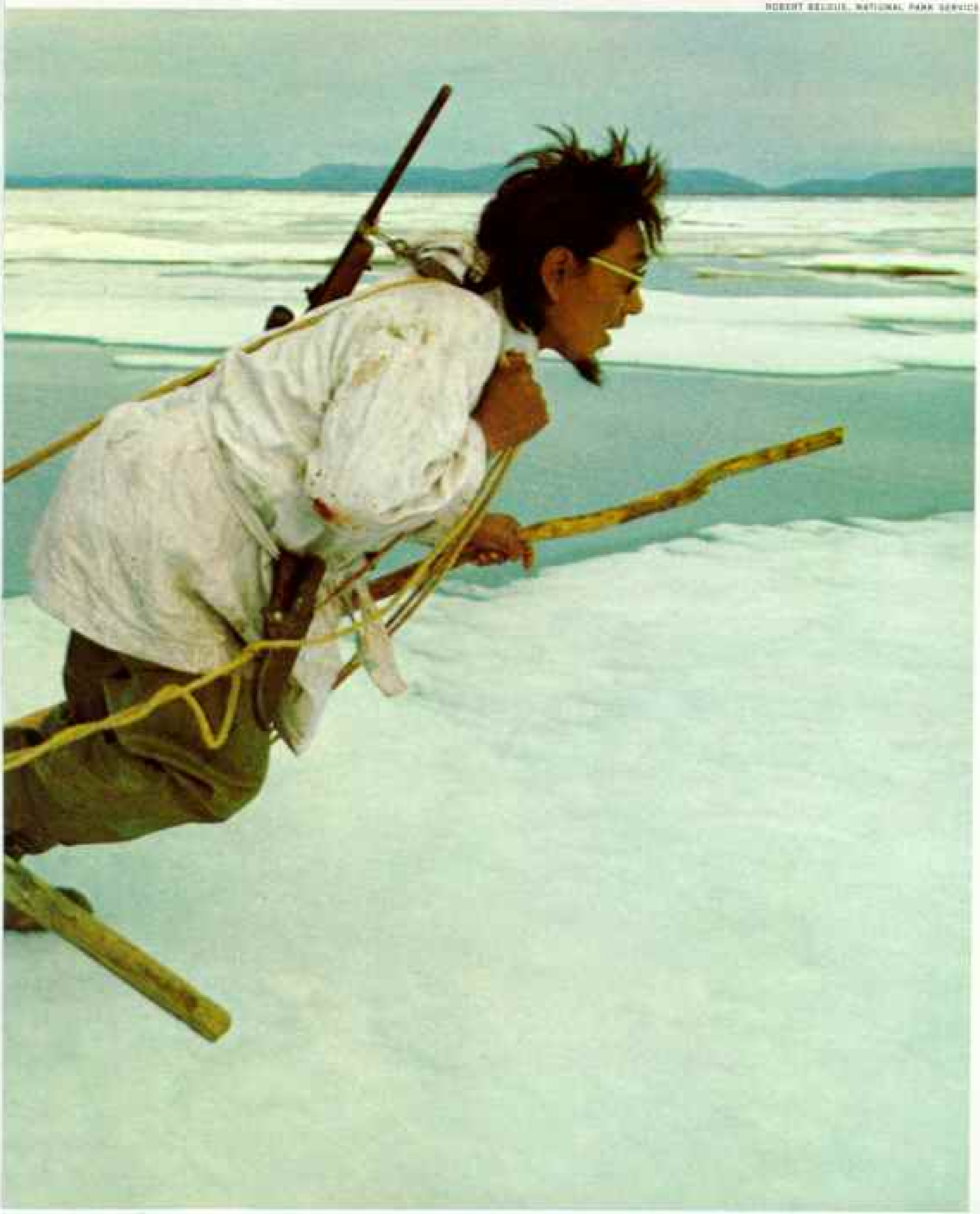
Helping drag the carcass to a boat waiting

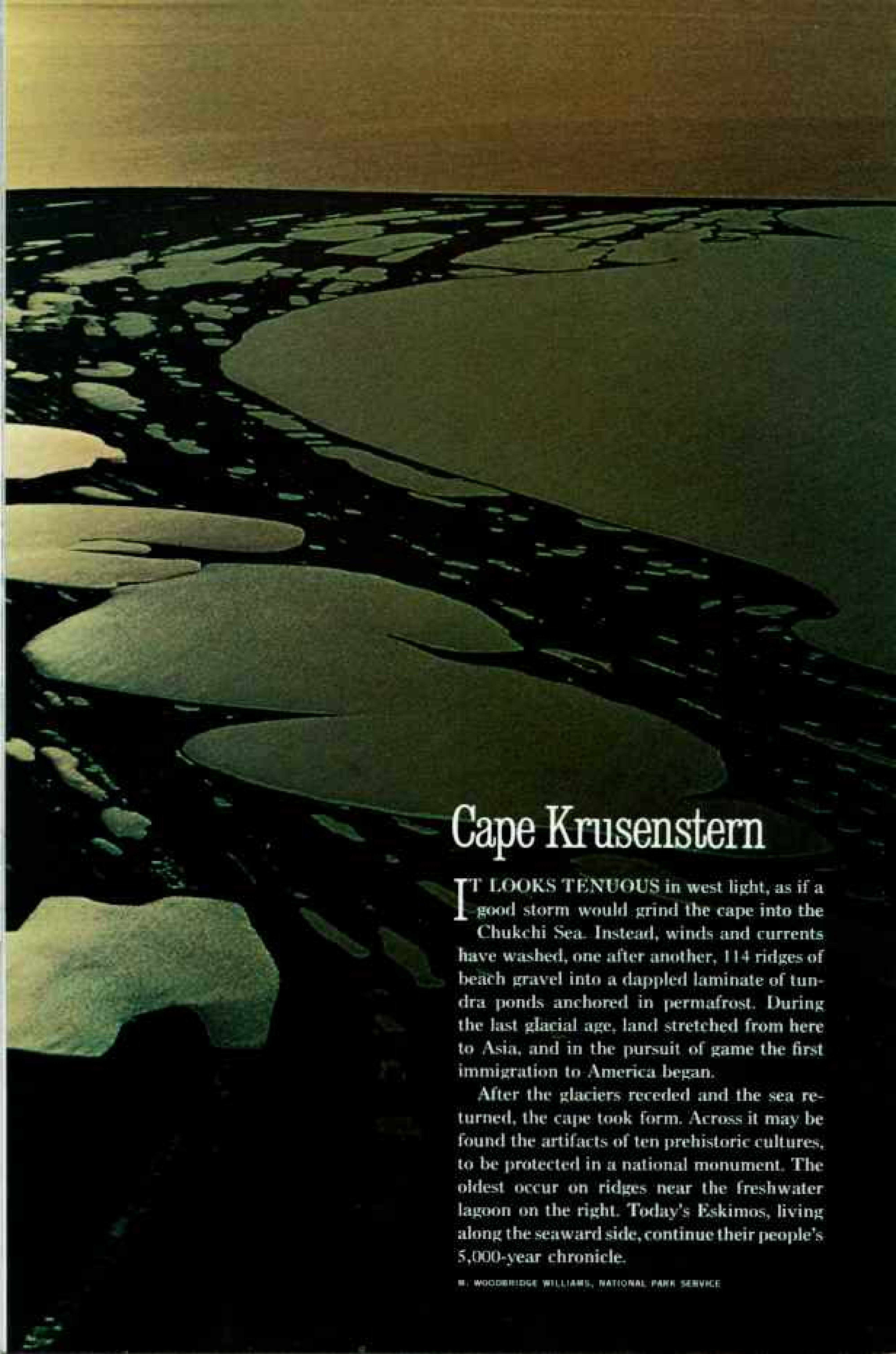


in an open lead, Eli Williams has taken several turns of line around a staff called *aiyaup-paak*. The spike serves as a probe to test ice conditions. Masters of the science of ice, Eskimos developed an entire lexicon to describe the origins and properties of all varieties. Livelihoods and lives can depend on such knowledge. Expert weathermen as well, they look to the horizon to check the hills of Cape Krusenstern (**following pages**), one of the most important archeological sites in North America and a proposed national monument. If the hills seem to shimmer, an east wind will come—and with it the danger of the ice floe being blown out to sea.

Ancient ways would not be artificially preserved in parklands, but they would be allowed, even encouraged. For they, no less than landscape and wildlife, provide crucial resources for understanding the arctic world.

ROBERT BELOUS, NATIONAL PARK SERVICE



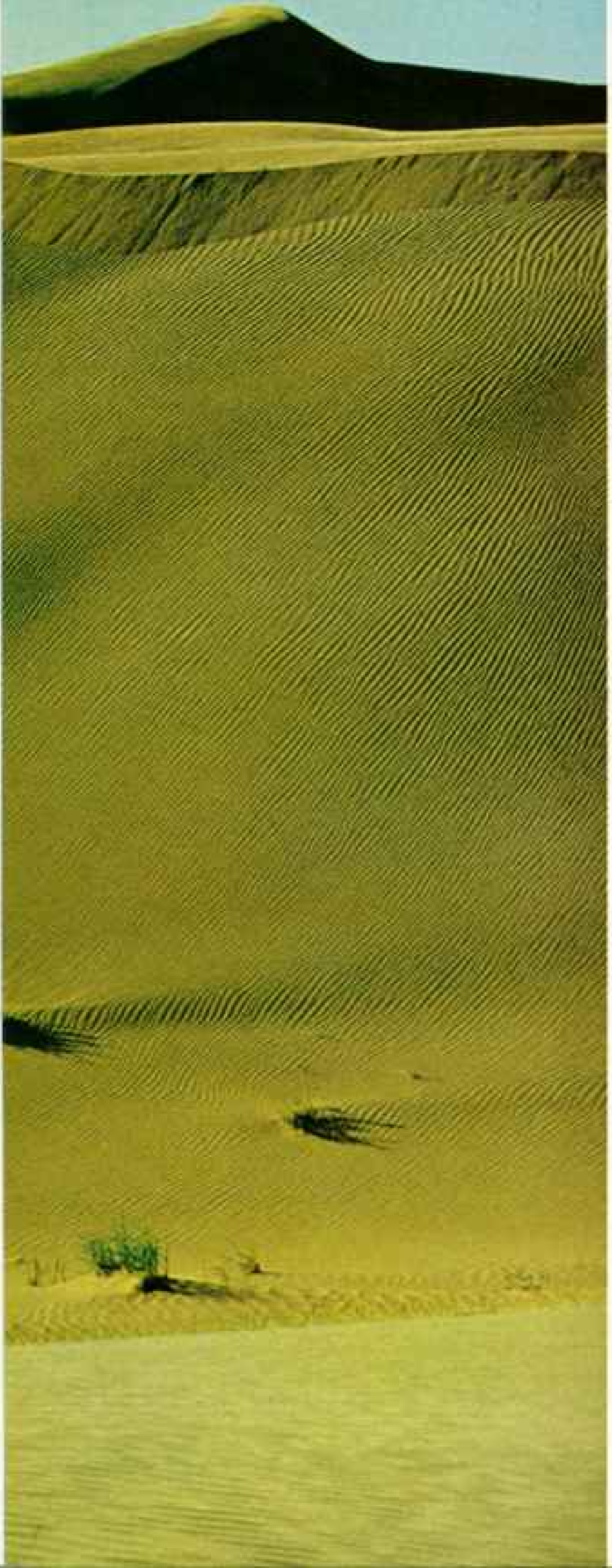


Cape Krusenstern

IT LOOKS TENUOUS in west light, as if a good storm would grind the cape into the Chukchi Sea. Instead, winds and currents have washed, one after another, 114 ridges of beach gravel into a dappled laminate of tundra ponds anchored in permafrost. During the last glacial age, land stretched from here to Asia, and in the pursuit of game the first immigration to America began.

After the glaciers receded and the sea returned, the cape took form. Across it may be found the artifacts of ten prehistoric cultures, to be protected in a national monument. The oldest occur on ridges near the freshwater lagoon on the right. Today's Eskimos, living along the seaward side, continue their people's 5,000-year chronicle.

M. WOODBRIDGE WILLIAMS, NATIONAL PARK SERVICE



Dunes along the Kobuk

DON'T LOOK FOR CAMELS but for grizzlies where 25 square miles of sand dunes ripple like corduroy along a river valley in northwestern Alaska, just north of the Arctic Circle. Origin of the sands, ranging from extremely fine to very coarse, remains unclear, but may be drift and outwash from glaciers of a much colder age.

From the dunes, nearly two million acres of the proposed Kobuk Valley National Monument spread north across mountains and flatlands, rivers, tundra, and spruce forest. Animal and bird life thrives, and much of the terrain permits easy traverse by foot or canoe.

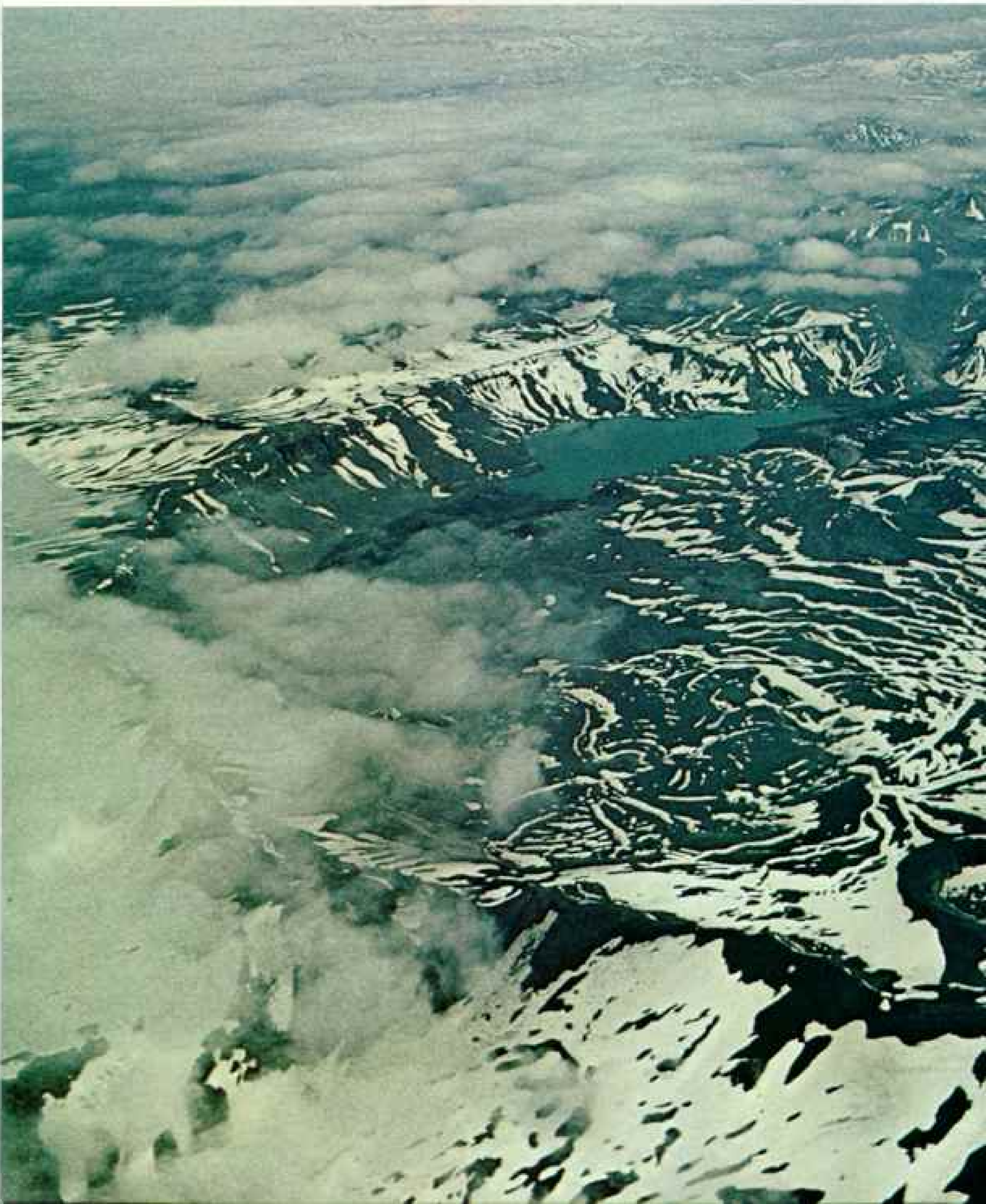
Subsistence fishing and caribou hunting would continue largely to support the area's Eskimos, as they have for millenniums. Archeological digs at Onion Portage on the region's eastern border confirm discoveries made at Cape Krusenstern, about 150 miles west. Eskimo hunters, who have helped plan the monument, would also help interpret its features to visitors. Parklands in Alaska, especially areas such as Kobuk, would remain a living tissue of men, nature, and the land—not just scenic specimens under glass.

Hikers and backpackers would have to avoid blundering into a caribou hunt, and canoeists and kayakers may need to portage around nets strung for the season's big salmon run. Such considerations would not be barriers so much as means to the enjoyment that comes with greater understanding.

JOHN L. NICHOLSON

Aniakchak Caldera

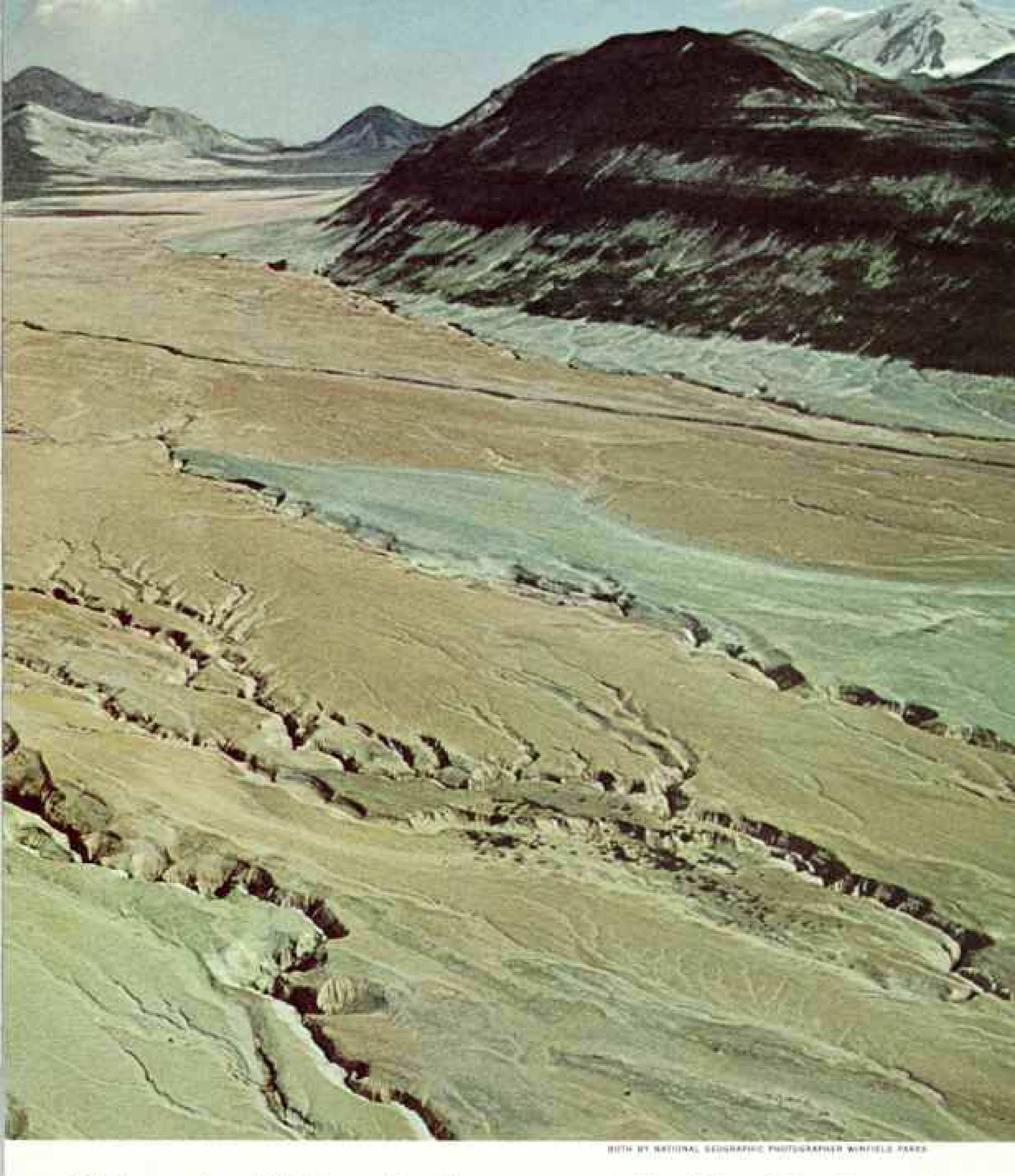
SIX MILES ACROSS from rim to rim, the caldera of Aniakchak was born in a stupendous explosion and collapse of the summit of a volcanic mountain. Proposed as a national monument, this spectacle of volcanism rides the seismically active Alaska Peninsula. Vent Mountain, born of a subsequent eruption, rises 2,200 feet above the



crater floor. Under the far rim the deep blue of Surprise Lake empties through a 2,000-foot rift and rattles 27 miles to the Pacific as the Aniakchak River. Together with other unspoiled watercourses both within and outside parklands, it would be included in the National Wild and Scenic Rivers System. Spawning season brings sockeye salmon to these icy waters—and the brown bears that follow that moveable feast.

As with much of Alaska, the most feasible access is by air, and floatplanes can land on Surprise Lake. Seen from the crater floor, Aniakchak's vents, lava flows, and ash fields soften under a succession of plants that attest to the tenacity of life.

M. WOODBRIDGE WILLIAMS, NATIONAL PARK SERVICE



BOTH BY NATIONAL GEOGRAPHIC PHOTOGRAPHER WINFIELD PARKS

Katmai

With the eruptions here in June 1912, earthquakes rumbled along the Alaska Peninsula, and the explosions were heard in Juneau, 750 miles away. For 60 hours ash blackened the skies over Kodiak, 100 miles away. Five early National Geographic expeditions left an important body of knowledge on volcanism—and impetus for designating the Mount Katmai volcano area a national monument. The Valley of Ten Thousand Smokes (**above**) finally cooled into a barren moonscape. A cemetery of trees (**left**) memorializes the devastation.

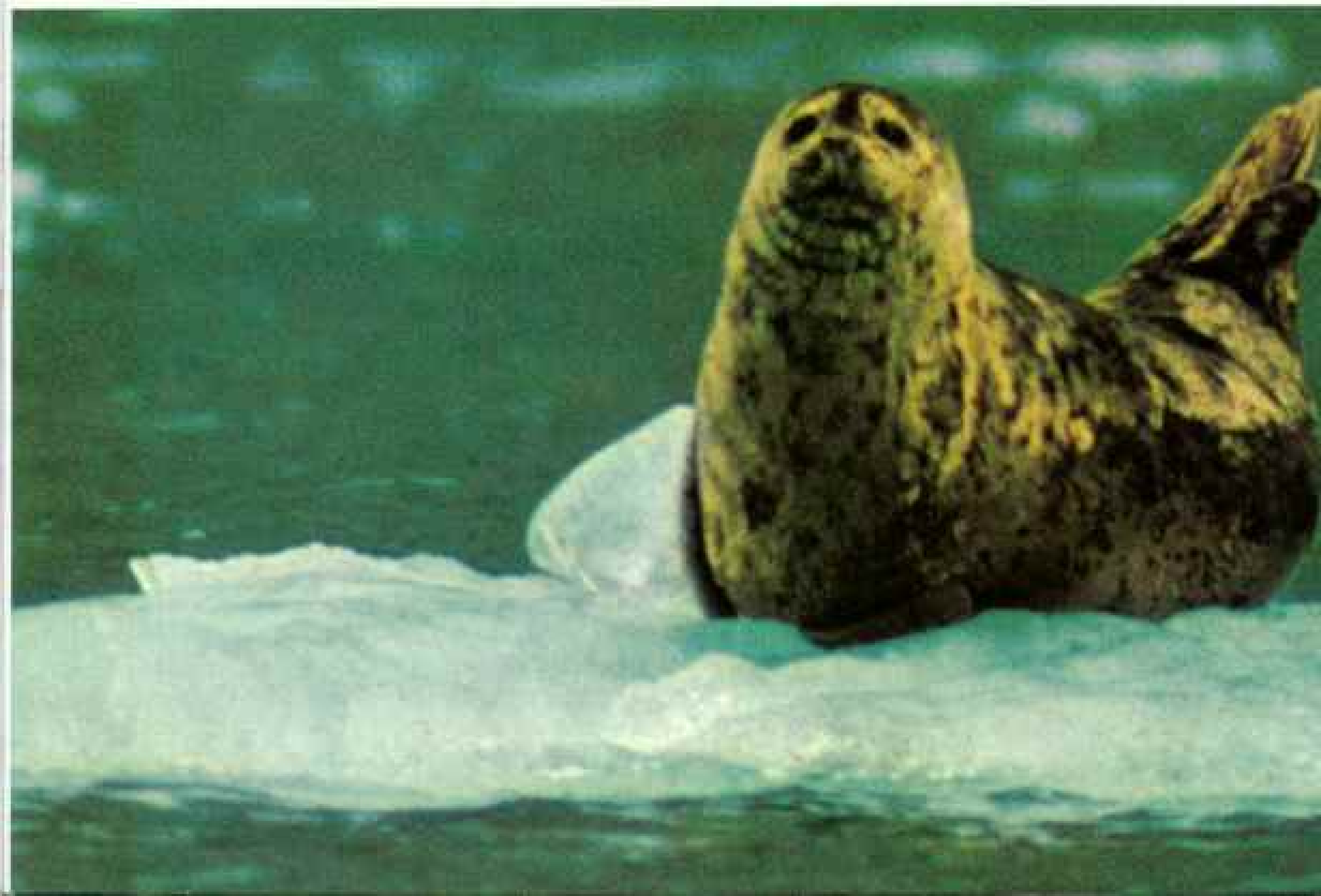
Over the years three additions were made to the monument to protect the region's lake system, seacoast, and wildlife. The proposed park would add about 1.9 million acres to the 2.8 million already administered by the Federal Government.

Wildlife in the balance

ROBERT BELOUS, NATIONAL PARK SERVICE

BEFORE HE SPLITS THE SKY and soars to emblematic stature, a fledgling bald eagle in his nest at Katmai (**left**) seems but a wobbly-jointed parody of an adult (**right**). Throughout the proposed parks and monuments, and within more than 31 million acres of new wildlife areas, important habitats would be kept intact.

Harbor seals at Kenai Fjords (**below**) bask on summer's shrunken ice cakes and gawk at tourists, who gawk back with benign intent; sport hunting would be prohibited here. While hunting may be a potential threat to game animals, it runs deep in the grain of Alaskan life. Natives have lived by it for thousands of years, other Alaskans for hundreds. Where it now occurs, subsistence hunting would be permitted in the new parklands so long as the natural balance is maintained. Limited sport hunting would be allowed in selected areas of six proposed parklands.



BOTH BY W. WOODBRIDGE WILLIAMS, NATIONAL PARK SERVICE

Realms of ice

"ICE IS THE SILENT LANGUAGE of the peak," Conrad Aiken wrote. If so, much of southern Alaska is a mute oration made by mountains. Harding Icefield, to be linked with Kenai Fjords in one national monument, covers more than 700 square miles. With few crevasses and no heart-pounding climbs, it confers solitude on three backpackers (**left**) who can lose themselves like three commas on a blank white page.

Here are the snows of yesteryear, compressed into glaciers like the Nabesna (**below**) that scour much of the eight-million-acre fastness of proposed Wrangell-St. Elias National Park. The mountains descend into gentler and richer terrain. Mining and logging may cut through adjacent country that enthusiasts feel should also be in the park.

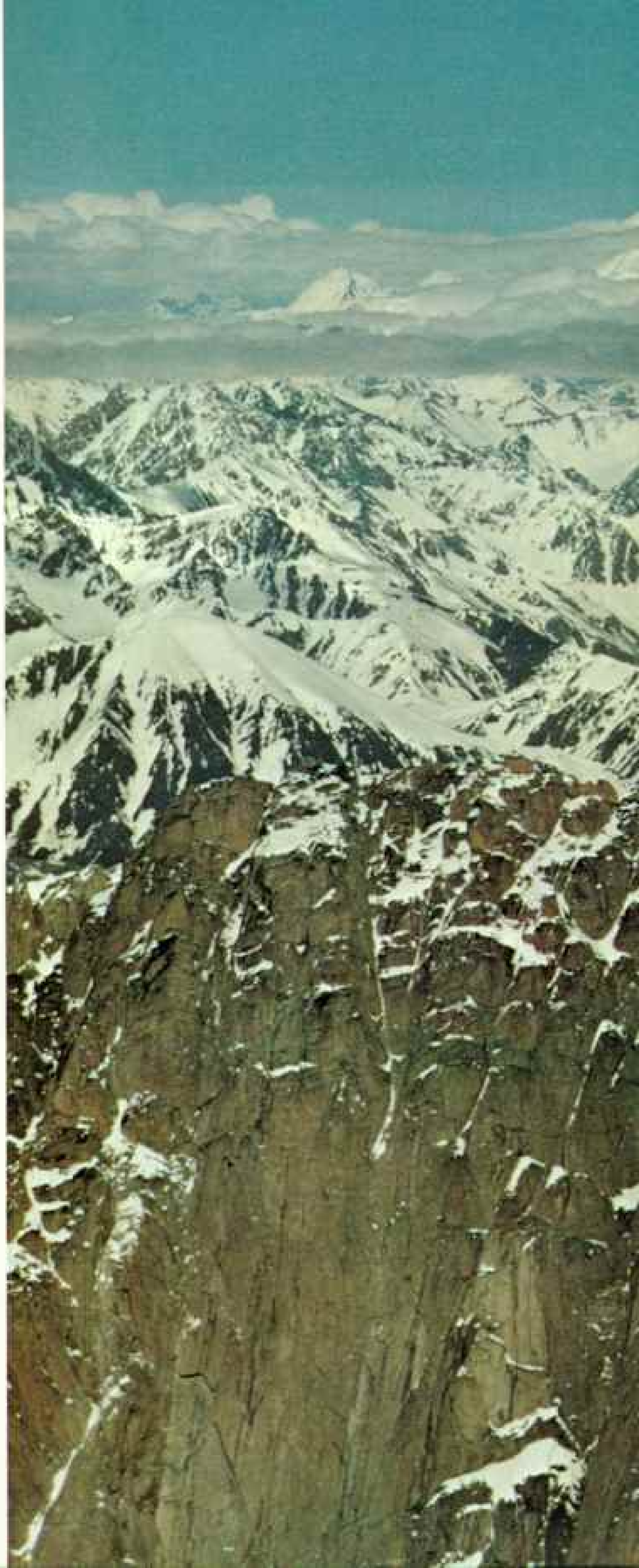
BILL RESOR (LEFT) AND M. WOODBRIDGE WILLIAMS, BOTH OF THE NATIONAL PARK SERVICE

Mount McKinley

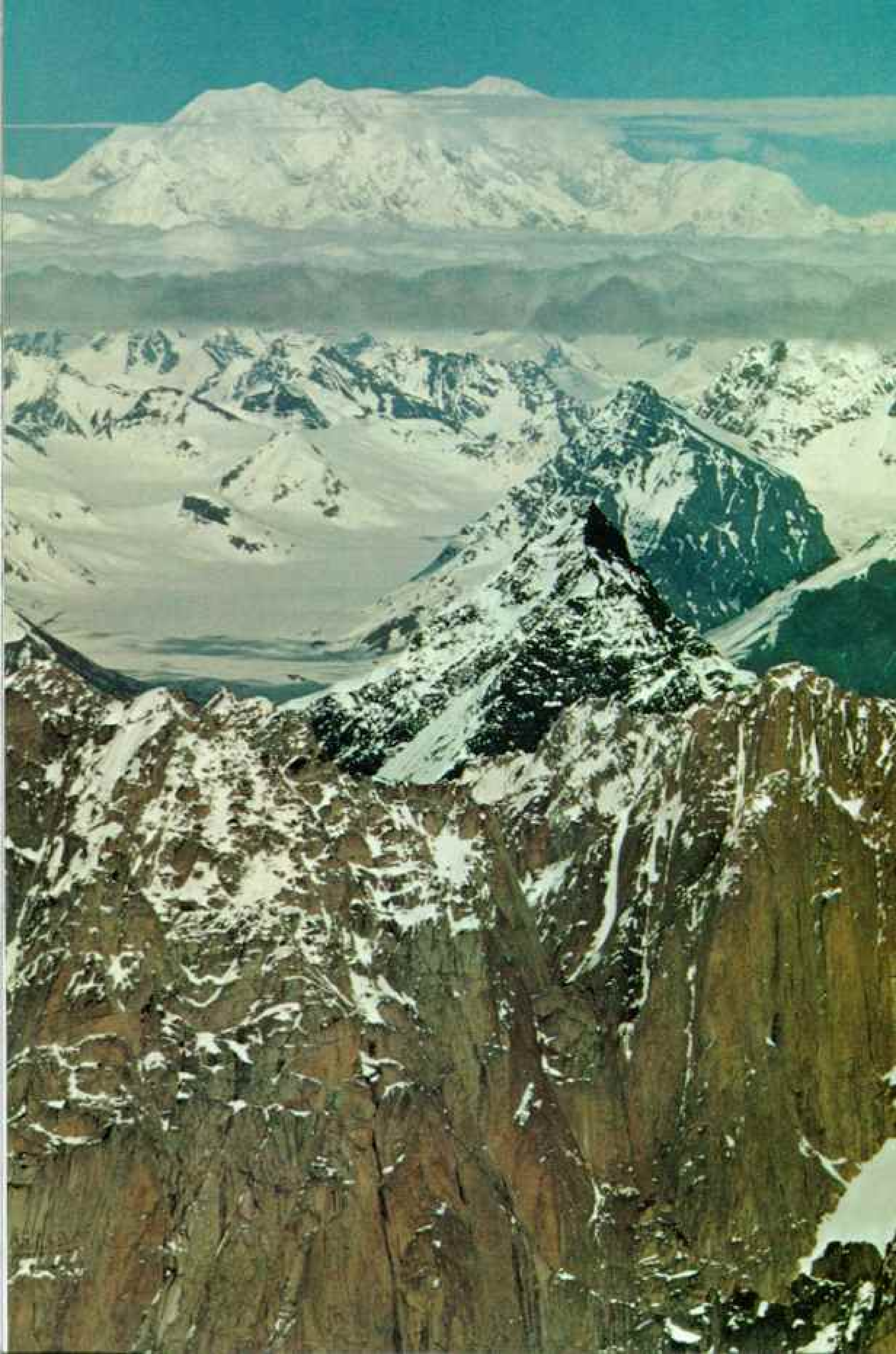
TALLEST MOUNTAIN in North America, the best-known landmark in Alaska now lies partly outside the park named for it. Designated additions would bring the entire mountain within Mount McKinley National Park, raising its acreage to just over five million.

In this view the gothic buttresses of Cathedral Spires give way to a crenellated middle ground of nameless peaks. Far beyond stands the mass of Mount Foraker. Even farther, peaking above the highest cloud layer, is McKinley—the Indians called it *Denali,* the Great One.

With the 1971 opening of the new park-bordering highway linking Anchorage and Fairbanks came symptoms of the Yellowstone syndrome—heavy use of a small part of a great park. Where people go, neon can follow. To forestall that, the Park Service envisions a planning and management zone outside the park where federal, native, state, and private interests can join in a development both prosperous and harmonious.



M. WOODBRIDGE WILLIAMS,
NATIONAL PARK SERVICE



Something for all: puffins to people

JOHN J. BURNS (TOP), E. C. KELLEY (ABOVE), AND M. WOODBRIDGE WILLIAMS, NATIONAL PARK SERVICE

NO TWO PROPOSALS can better show the diversity of concept and purpose of Alaska's new parklands than coastal Chukchi-Imuruk National Reserve and Lake Clark National Park. Chukchi-Imuruk will not soon attract the casual tourist. Scenic grandeur does not assault the eye, nor are accommodations grand. And yet, here the past and present of native people meld. Here lava flows and explosion craters document some of the Arctic's most remarkable geology. And here migratory birds from nearly every continent nest or stop over. The king eider (**left, above**) puts down offshore, and the tufted puffin (**left**), who looks like a clown, flies well enough to get the job done.

By contrast, Lake Clark would be the kind of national park most people would order a la carte from a yard-long menu of nature's fare. Start with a seacoast, then add smoking volcanoes, alpine valleys, and spectacular mountains that in turn fall away to tundra. Season with trout, bear, moose, and sheep. And for something to drink, braided rivers (**right**) that pour from glaciers. Small by Alaskan standards at 2.6 million acres, the park will be a fair-size backyard for the people of Anchorage.

When Alaska's oil runs out, as it will, the parks will remain. Then, perhaps, the last frontier and the last wilderness will become as one. The question is not will people come, but how many and how soon. □

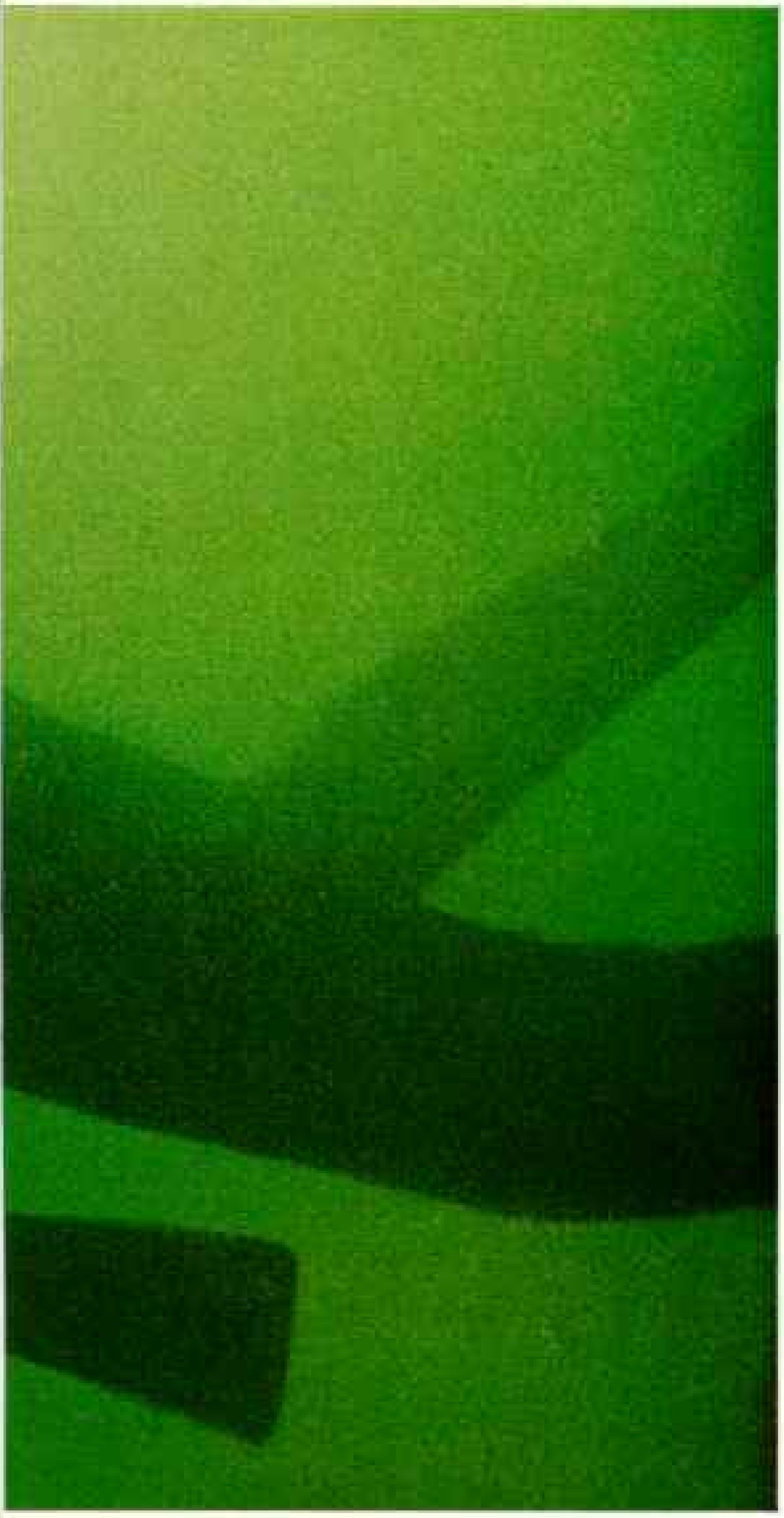
New Life for the Troubled

By WILLIAM GRAVES
ASSISTANT EDITOR

Photographs by JONATHAN BLAIR

On a murky mission for peace, a diver brings up a Soviet AK-47 rifle during the clearing of

Suez Canal



Egypt's waterway, closed since 1967.

GROPING OUR WAY through water dark with silt, Mohsen El-Gohary and I drift cautiously down on the bomb. It lies armed and lethal in some forty feet of water, half buried in the mud of the Suez Canal floor.

As we approach the bottom, I edge closer to Mohsen; with visibility limited to a few feet, I have no urge to go exploring. I am simply an observer in a dangerous task, that of clearing the Suez Canal of the debris of war.

Happily for me the dive is brief, merely involving inspection of the bomb. Found earlier by Egyptian Navy divers, it has been identified as an Israeli 550-pounder, probably dropped during the Arab-Israeli war of 1973. Mohsen's job as an Egyptian ordnance expert is to determine whether the bomb should be recovered for study or blown up where it lies.

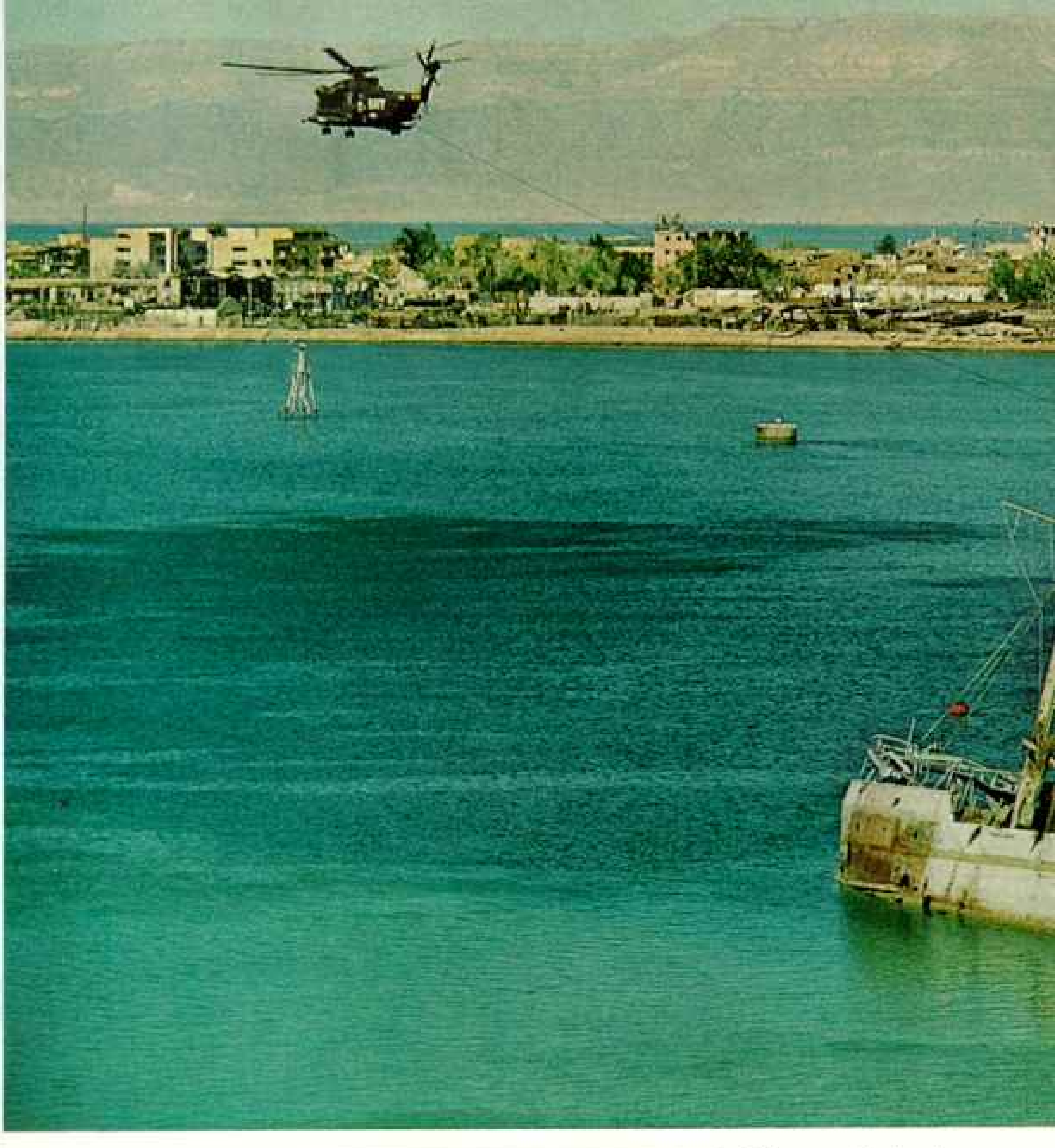
The answer comes quickly. Concentrating on the bomb's exposed fuse, Mohsen probes it thoughtfully with his hand in a way that gives me chills, even in the 75-degree water. After a pause he shakes his head and gestures upward: The job calls for a demolition team.

Nations Join to Unclog Waterway

Such episodes were common along the Suez Canal last autumn in the midst of clearing operations. During more than a month of exploring the historic waterway, I met many with Mohsen's courage and dedication. Not all were Egyptian, for in the massive challenge of reopening the canal, the Arab Republic of Egypt received help from many quarters, notably the United States, Great Britain, and France. The gesture represented a major effort to promote peace in an explosive area of the world; it cost U. S. taxpayers alone more than $20,000,000.

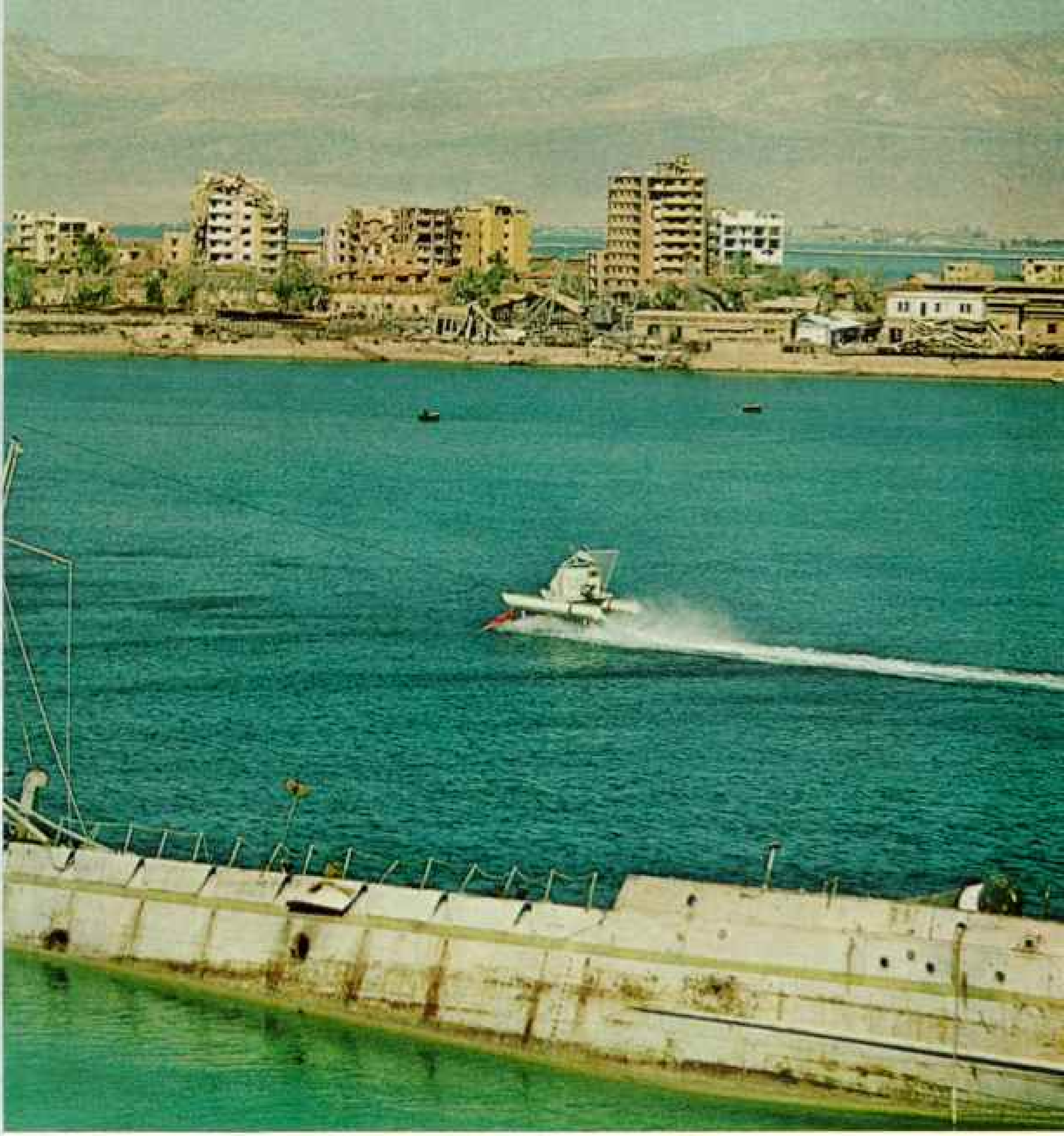
Whether such international efforts will help bring lasting peace depends in some measure on the Suez Canal itself.

The canal when I saw it belonged temporarily to several hundred ordnance and salvage technicians from several countries in addition to Egypt. As a result of years of intermittent combat between Egypt and Israel, the waterway had become a giant slag heap of war—blocked by scuttled and sunken ships, strewn with unexploded ammunition, abandoned by more than a million Egyptians who had fled their homes along its banks, and occupied on either side by mortal enemies. Along the 100-mile-long canal, scarcely an



Minesweeping by chopper: At war-battered Port Taufiq, a U.S. Navy Sea Stallion (**above**) tows a sled that detonates magnetic mines—first phase of the clearing operation. The shelled Egyptian ship in the foreground was later removed.

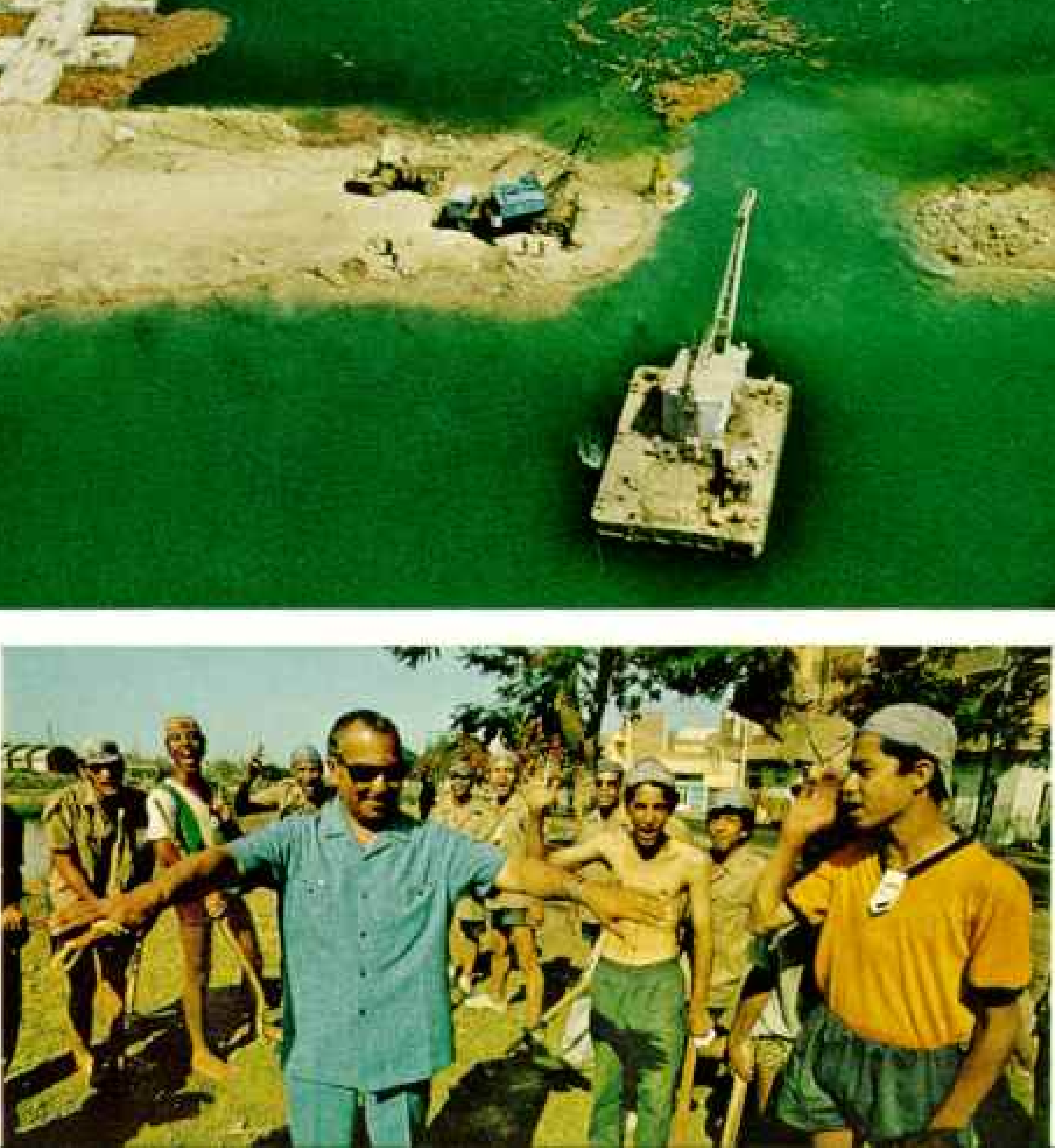
Faced with the debris of years of cross-canal fighting between Egyptians and Israelis, Egypt asked the

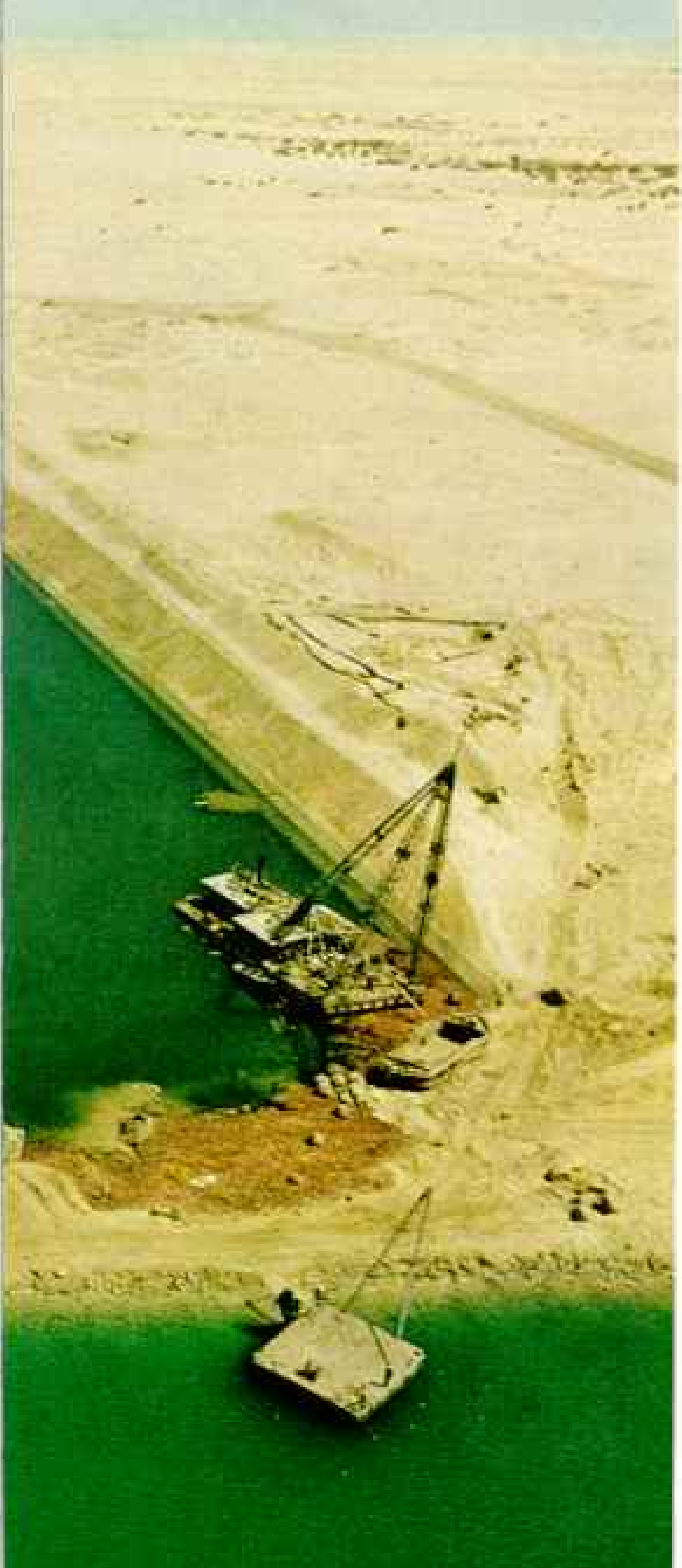


United States to help with the cleanup. British and French Navies joined in.

A U.S. Navy adviser in shorts (**left**) helps Egyptian divers identify and dispose of ordnance found underwater: more than 9,000 items, from rifles and grenades to tanks.

Dressed for 110° F., an American Navy technician (**right**) checks schedules near a helicopter pad at canalside.





acre had escaped being fortified or damaged.

Such was the challenge in early 1974, when a disengagement agreement and Israel's subsequent withdrawal from the canal offered the first real hope in more than six years. Egypt promptly announced its intention to reopen the waterway, whose closure since 1967 had cost the world an estimated 12 billion dollars in higher shipping costs, including the expense of the longer route around the Cape of Good Hope. By this spring the canal was clear of war debris. Egyptian President Anwar Sadat announced that the waterway would reopen on June 5.

For nearly a century after its completion in 1869, the Suez Canal was a highroad of commerce and empire, linking the nations of Europe with far-flung outposts and funneling the raw wealth of Asia and East Africa—rubber, oil, coal, tin, and manganese—to industrial markets in the West.

During the peak year of 1966 more than 21,000 ships passed through the canal. But to regain such importance, I discovered, the waterway must expand to keep pace with a worldwide revolution in transportation.

Two Wars Cause Two Blockages

The decision to reopen the canal brought to Egypt such men as Rear Adm. Kent J. Carroll, in command of the U. S. Navy task force sent to assist in the clearing operation. One morning I accompanied him on a helicopter flight from the battle-scarred city of Ismailia midway along the canal to the southern entrance at Port Taufiq (map, page 801).

In preparation for his assignment, Admiral Carroll had obviously done considerable research. As we skimmed southward above the bright ribbon of water, hemmed on either side by vast reaches of desert, he gave me an illustrated course in modern Suez Canal history.

"This is the second time Egypt has cleared the canal," the admiral began. "After the late President Gamal Abdel Nasser nationalized

Tranquil shipway became a battlefront in June 1967, when the Israelis thrust across the Sinai desert. On the east bank they later built the Bar-Lev Line (**above,** right), which included a huge sand embankment and many fortified bunkers. After the Yom Kippur war of October 1973, Israelis constructed the Deversoir Causeway across the canal with ten-ton boulders and sunken barges. With the 1974 disengagement agreement, they withdrew about 15 miles east. Here floating cranes breach this obstacle to ships.

Conjurer of progress, Osman Ahmed Osman, Minister of Housing and Reconstruction (**left**), encourages youths clearing rubble at Ismailia. He envisions a multibillion-dollar development along the 100-mile canal as an incentive for peace.

it in 1956, war with Israel, Britain, and France resulted in major blockage that closed the waterway for five months. But the six-day war of 1967 shut it down for years. At that time Egypt scuttled several vessels in the canal to deny its use to Israel, and Israel occupied the east bank." He waved toward a line of fortifications sweeping by on our left.

"That's the famous Bar-Lev Line the Israelis constructed in 1968-69. It was built while both sides were pounding each other across the canal with artillery and occasional air strikes. Now look off to the right; you'll get a glimpse of some of Egypt's deadliest defenses." Dotting the desert at wide intervals were the ominous sites of Soviet-built SAM's, the surface-to-air missiles that had taken a heavy toll of the Israeli Air Force.

Farther along the canal we came to the remnants of a huge dike that had obviously once spanned the entire canal.

"That's still another chapter, the Deversoir Causeway," Admiral Carroll explained. "After the October war of 1973, Israeli engineers built it to support their forces on the west bank. It's a massive thing, made of huge stones and sunken barges, the largest single obstacle in the canal" (preceding pages).

Over the course of an hour we took in a variety of other sights, including a huge natural bulge in the canal known as the Bitter Lakes and the jumbled ruins of Suez and Port Taufiq. Here, on a triumphant day in November 1869, the French builder of the canal, Ferdinand de Lesseps, completed the historic first transit of the waterway with other dignitaries aboard a ceremonial fleet that had sailed from Port Said in the north (pages 802-803).

Egypt Plans Wider, Deeper Waterway

Back in Ismailia once more, Admiral Carroll wished me luck on my inspection trip.

"You've got a surprise in store for you," he said. "Americans tend to think that Egyptians don't much care for them because of our policies in the Middle East. But the U. S. role in clearing operations has made a tremendous difference. You'll find many unexpected friends along the canal."

I found not only friends but also a surprising awareness that work on the canal has only just begun. Simply to restore the waterway to its prewar operating level will cost Egypt at least $288,000,000. But to recapture world trade lost during the blockage, especially oil shipments from the Persian Gulf to Europe and the United States, Egypt must greatly enlarge the canal.

"In this age of giant tankers," a U. S. authority on world shipping had told me, "the Suez Canal has become an antique. Nowadays a fully loaded tanker may draw 73 feet of

Diving amid danger, Egyptian Navy man Mustafa Gomaa and 130 teammates searched the canal bottom, foot by foot, where sonar indicated concentrations of ordnance. In some places visibility was so poor the men relied on touch alone.

Pyramid of scrap, the 900-ton stern of the passenger ship *Mecca* rests on the bank near Port Fuad. Using underwater torches and explosives, American divers cut apart ten major vessels scuttled by the Egyptians in 1967 to block the canal. The sections were raised with cranes and heavy-lift craft.

water—about 25 feet more than the canal's depth. Eight years ago, most of the world's tankers could use Suez. Today only one out of four can make it. The route of the future lies around the Cape of Good Hope."

Not if Mashhour Ahmed Mashhour and his fellow engineers can help it. As chairman of Egypt's Suez Canal Authority, Mr. Mashhour is already thinking far beyond the reopening of the canal. At his headquarters in Ismailia, he gave me a view of the waterway as Egypt foresees it in the 1980's.

"Time, not Israel, is the great enemy now," Mr. Mashhour began. "We have lost nearly eight precious years and we cannot spare another day, for the job ahead of us is enormous. To handle today's traffic, we must vastly enlarge the canal. The original waterway required excavation of 97,000,000 cubic yards of earth. Within the next decade we must excavate more than 300,000,000 cubic yards. This gives you an idea of the final result."

Unfolding a diagram of the canal in cross-section, he pointed to successive layers shaded in various colors.

"The top layer represents the canal as it is today," Mr. Mashhour explained. "The diagram shows the width to be approximately 200 yards, with a channel depth of 49 feet. The dark-blue layer below indicates our initial goal, with the channel dredged to a 51-foot depth. The pink layer represents 64 feet, and the final one, forecast for the 1980's, shows the canal expanded to a width of nearly 350 yards and a depth of 77 feet.

"At that point," he added, "supertankers of 300,000 deadweight tons can pass fully loaded through the canal and cut 4,000 miles off the Cape of Good Hope route."

Pipeline Will Lighten Supertankers

I remarked that tankers of nearly half a million tons were already in service on the high seas. Presumably these would still have to use the long route.

"Perhaps the real giants will have to use the cape route," Mr. Mashhour answered. "But we have begun construction of a double pipeline from the Gulf of Suez to a point west of Alexandria on the Mediterranean Sea.

"The main purpose is to transmit oil from our offshore wells in the Red Sea to mainland industrial centers, but the pipeline will serve canal traffic as well. Many tankers with a loaded draft too great for the canal will be able to pump their cargo ashore at the port of Suez, pass through the canal partially loaded, then fill up again at the pipeline's Mediterranean end. The entire process will take less than 24 hours, compared to ten extra days around the Cape of Good Hope."

"Disobedient" Wife Rescues Husband

If Mr. Mashhour's plans go through for widening the canal, Ali Tawab very likely will have to move his house. Considering that he stoutly refused to abandon it to a terrible war, the government may find him reluctant.

I met him near El Qantara, a ghostly ruin of a town bisected by the canal 20 miles north of Ismailia. Despite its name—the Bridge—El Qantara's west bank never suffered invasion, though many residents would have preferred a human assault. What crossed the canal instead was a years-long hailstorm of artillery shells. Israeli guns devastated the west bank, and Egyptian guns the east bank.

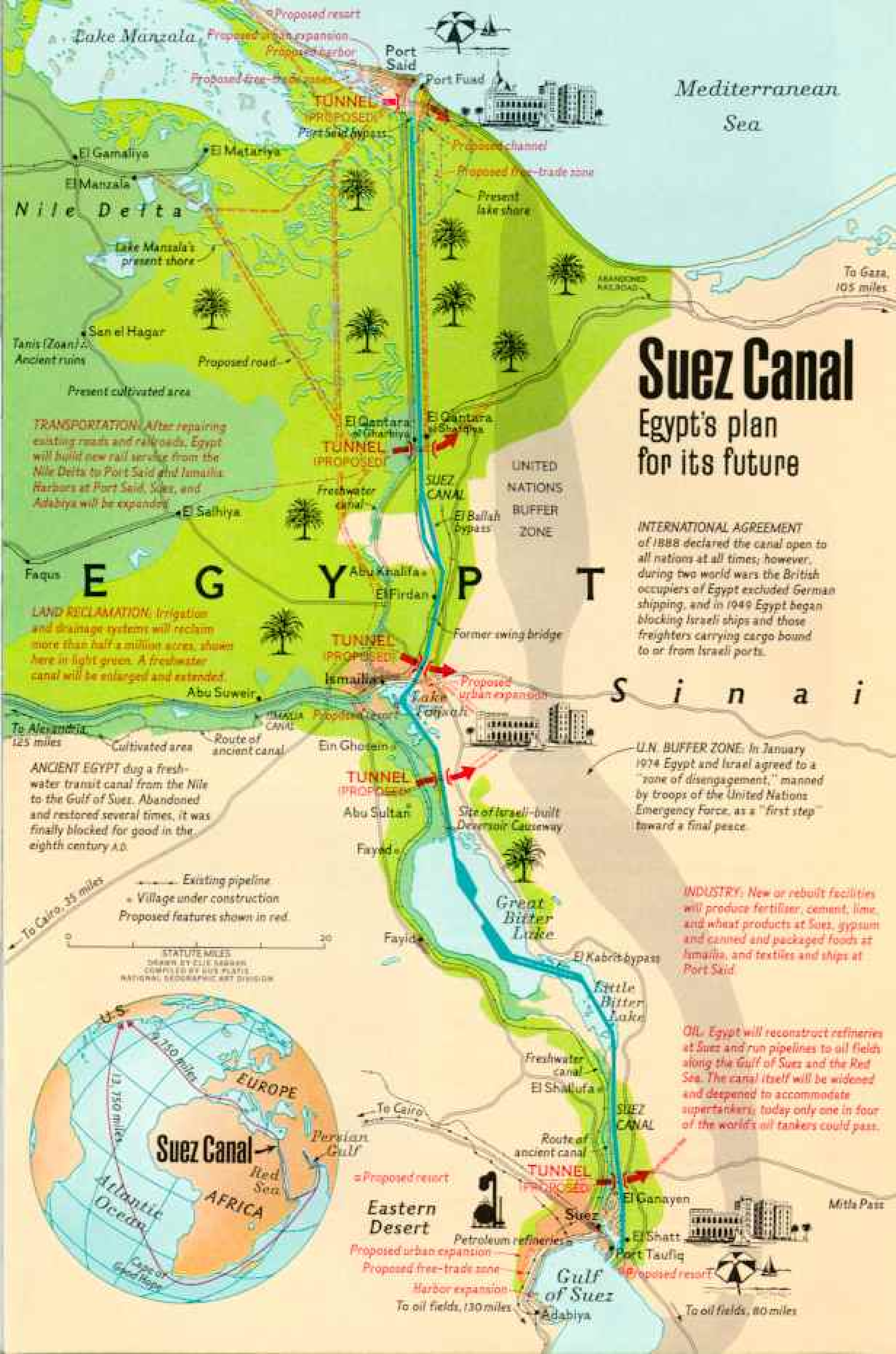
The effect was that of a giant road grader, first leveling the town, then piling it back on its own foundations. Here and there a ruined house still stood amid giant mounds of rubble, like some solitary desert outpost abandoned to the dunes.

The devastation is doubly painful to Ali Tawab, for he built a number of houses in the town. During my search for refugee families recently returned to El Qantara, I found him one afternoon at his house on the canal's west bank, a mile or two south of town. A handsome man in his seventies, with white hair and a glint of humor in his brown eyes, he sat surrounded by a group of children and grandchildren in front of his partially destroyed house. It was some time before I realized he was blind.

Over cups of sweet tea Mr. Tawab spoke of his life as a builder along the canal. His career had been interrupted by five separate wars, starting with World War I and ending with the October war of 1973. During the latter, he told me, El Qantara's few remaining inhabitants had finally abandoned hope and fled westward beyond the war zone. He himself refused to join them.

"I said to my neighbors, 'Stay and keep me company,'" he recalled, "but they could not bear to watch the town die. As for me, I no longer had the use of my eyes, and I would only have been a burden on the road."

Packing his family off to stay with distant relatives, Mr. Tawab remained in the house with his wife, who refused to leave her


Proposed resort
Lake Manzala
Proposed urban expansion
Proposed harbor
Proposed free-trade zone
Port Said
Port Fuad
Mediterranean Sea
TUNNEL (PROPOSED)
Port Said bypass
Proposed channel
Proposed free-trade zone
El Gamaliya
El Matariya
El Manzala
Nile Delta
Present lake shore
Lake Manzala's present shore
ABANDONED RAILROAD
To Gaza, 105 miles
San el Hagar
Tanis (Zoan) Ancient ruins
Proposed road
Present cultivated area
El Qantara el Gharbiya
El Qantara el Sharqiya
TUNNEL (PROPOSED)
UNITED NATIONS BUFFER ZONE
Freshwater canal
SUEZ CANAL
El Ballah bypass
El Salhiya
Faqus
E G Y P T
Abu Khalifa
El Firdan
Former swing bridge
TUNNEL (PROPOSED)
Ismailia
Proposed urban expansion
Lake Timsah
Sinai
Abu Suweir
ISMAILIA CANAL
Proposed resort
To Alexandria, 125 miles
Cultivated area
Route of ancient canal
Ein Ghosein
TUNNEL (PROPOSED)
Abu Sultan
Site of Israeli-built Deversoir Causeway
Fayid
Great Bitter Lake
Existing pipeline
Village under construction
Proposed features shown in red.
To Cairo, 35 miles
0 20
STATUTE MILES
DRAWN BY ELIE SABBAN
COMPILED BY GUS PLATIS
NATIONAL GEOGRAPHIC ART DIVISION
Fayid
El Kabrit bypass
Little Bitter Lake
U.S.
9,750 miles
13,750 miles
EUROPE
Suez Canal
Persian Gulf
Red Sea
AFRICA
Atlantic Ocean
Cape of Good Hope
Freshwater canal
El Shallufa
To Cairo
SUEZ CANAL
Route of ancient canal
TUNNEL (PROPOSED)
Proposed resort
El Ganayen
Mitla Pass
Eastern Desert
Suez
Petroleum refineries
El Shatt
Port Taufiq
Proposed urban expansion
Proposed free-trade zone
Proposed resort
Harbor expansion
Gulf of Suez
To oil fields, 130 miles
Adabiya
To oil fields, 80 miles

Suez Canal

Egypt's plan for its future

INTERNATIONAL AGREEMENT of 1888 declared the canal open to all nations at all times; however, during two world wars the British occupiers of Egypt excluded German shipping, and in 1949 Egypt began blocking Israeli ships and those freighters carrying cargo bound to or from Israeli ports.

TRANSPORTATION: After repairing existing roads and railroads, Egypt will build new rail service from the Nile Delta to Port Said and Ismailia. Harbors at Port Said, Suez, and Adabiya will be expanded.

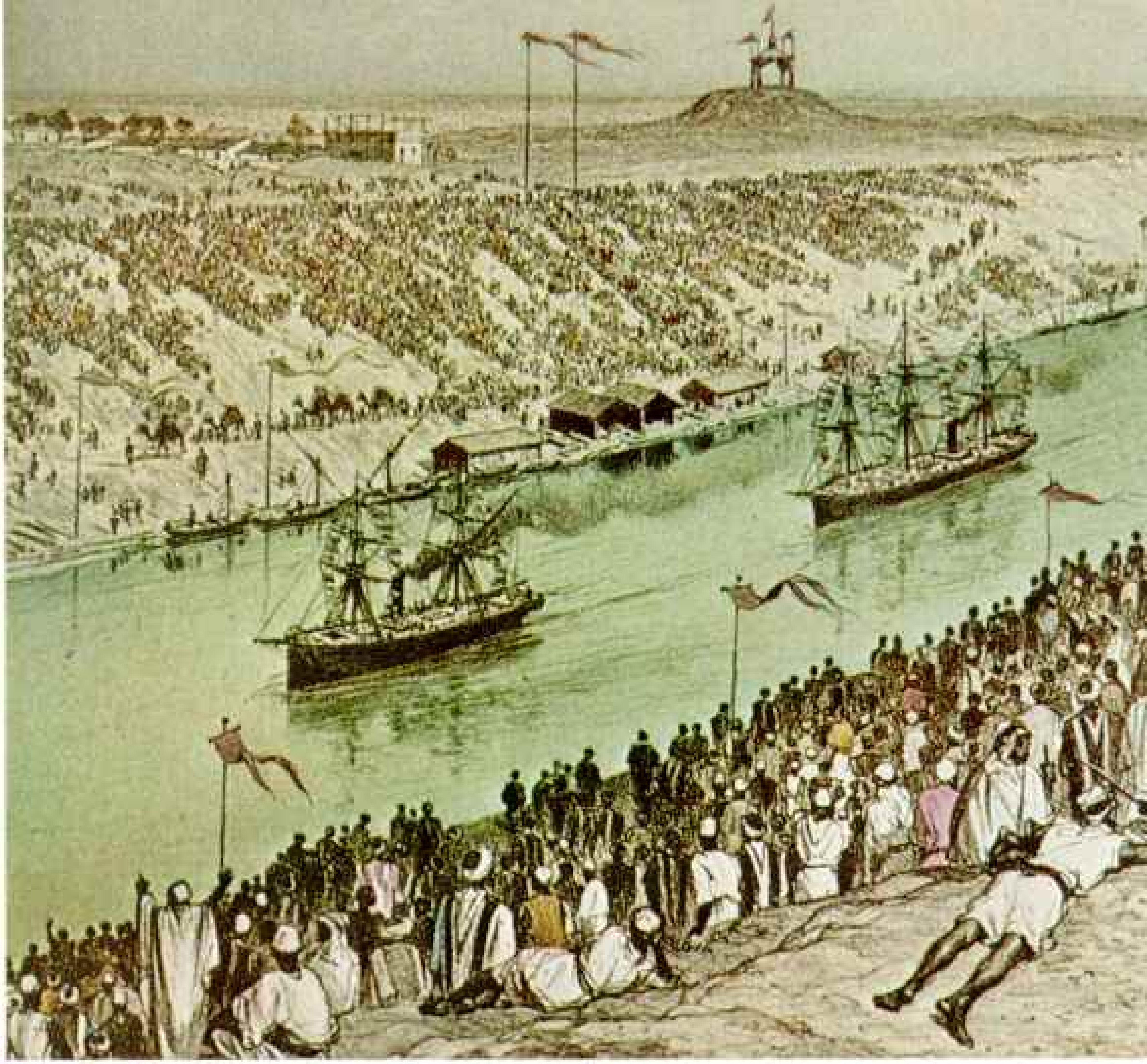
LAND RECLAMATION: Irrigation and drainage systems will reclaim more than half a million acres, shown here in light green. A freshwater canal will be enlarged and extended.

U.N. BUFFER ZONE: In January 1974 Egypt and Israel agreed to a "zone of disengagement," manned by troops of the United Nations Emergency Force, as a "first step" toward a final peace.

ANCIENT EGYPT dug a freshwater transit canal from the Nile to the Gulf of Suez. Abandoned and restored several times, it was finally blocked for good in the eighth century A.D.

INDUSTRY: New or rebuilt facilities will produce fertilizer, cement, lime, and wheat products at Suez, gypsum and canned and packaged foods at Ismailia, and textiles and ships at Port Said.

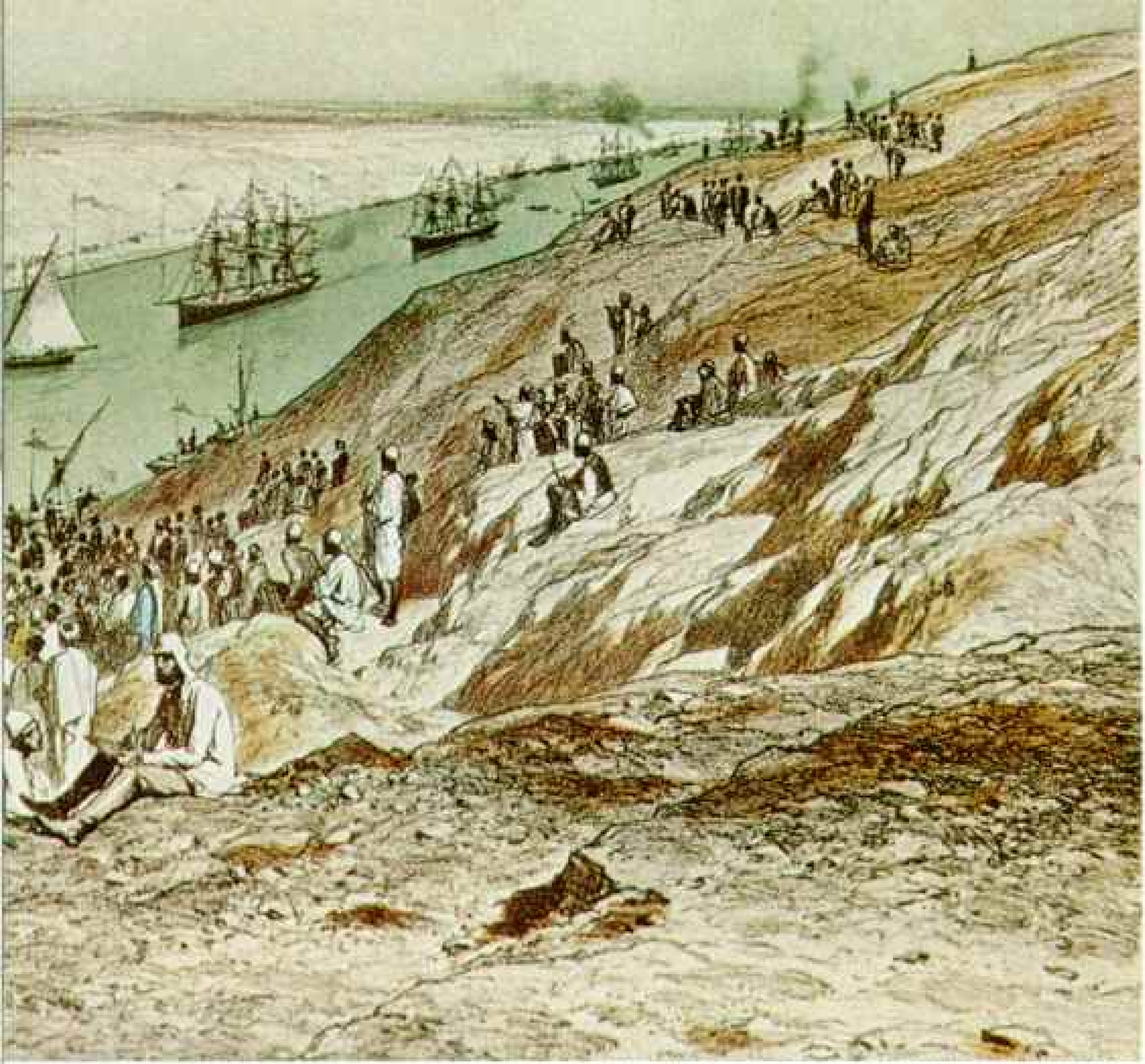
OIL: Egypt will reconstruct refineries at Suez and run pipelines to oil fields along the Gulf of Suez and the Red Sea. The canal itself will be widened and deepened to accommodate supertankers; today only one in four of the world's oil tankers could pass.



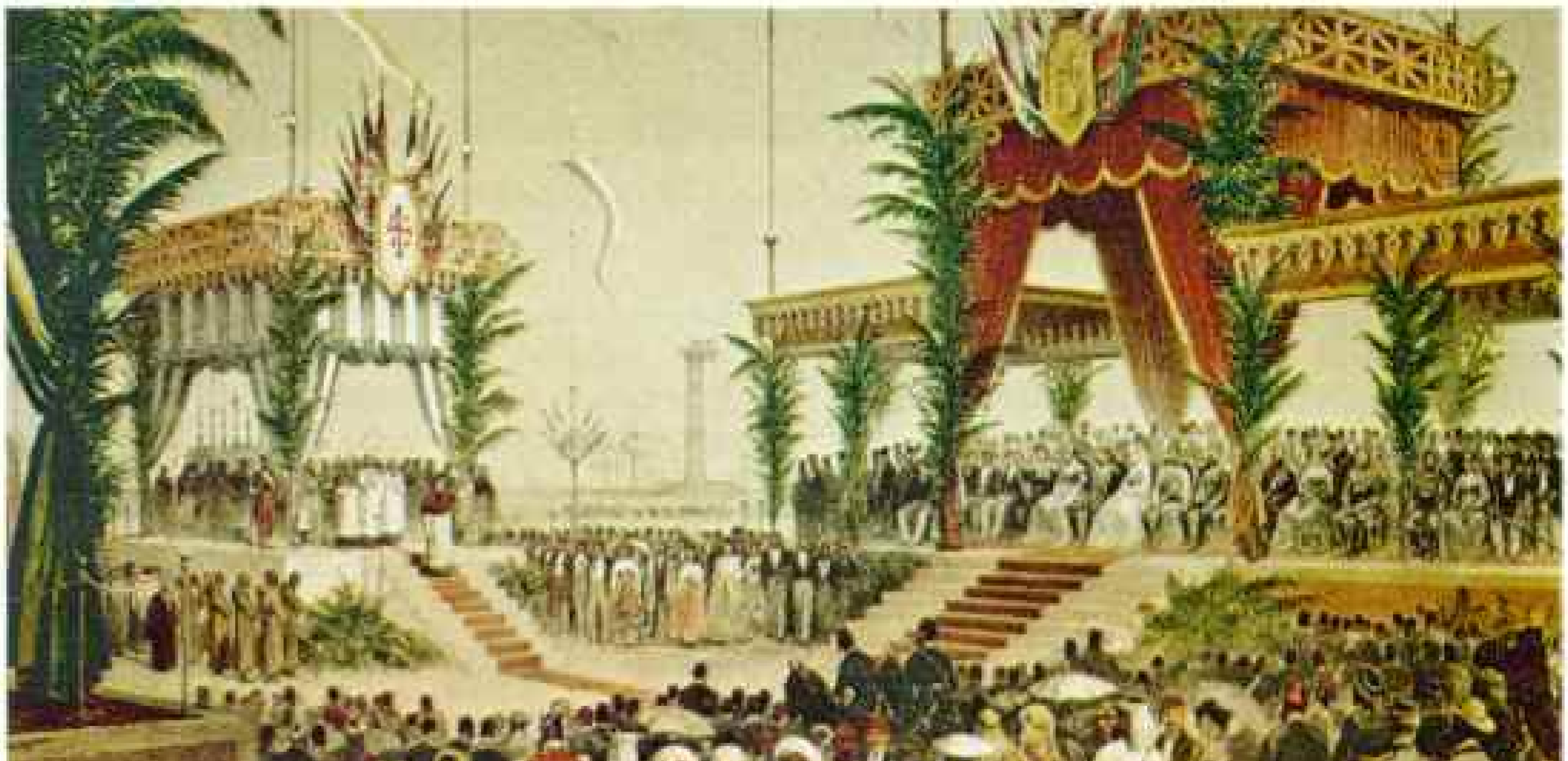
Ferdinand de Lesseps' dream—a shortcut to the Far East—came true in November 1869, with the opening of the Suez Canal (**above**). The French diplomat (**right**) spearheaded the project "to break down the barriers which still divide men, races, and nations." Gaining the permission of Egypt's ruling pasha in 1854, he formed an international company and employed as many as 25,000 Egyptians to dig out a total of 97,000,000 cubic yards of earth.

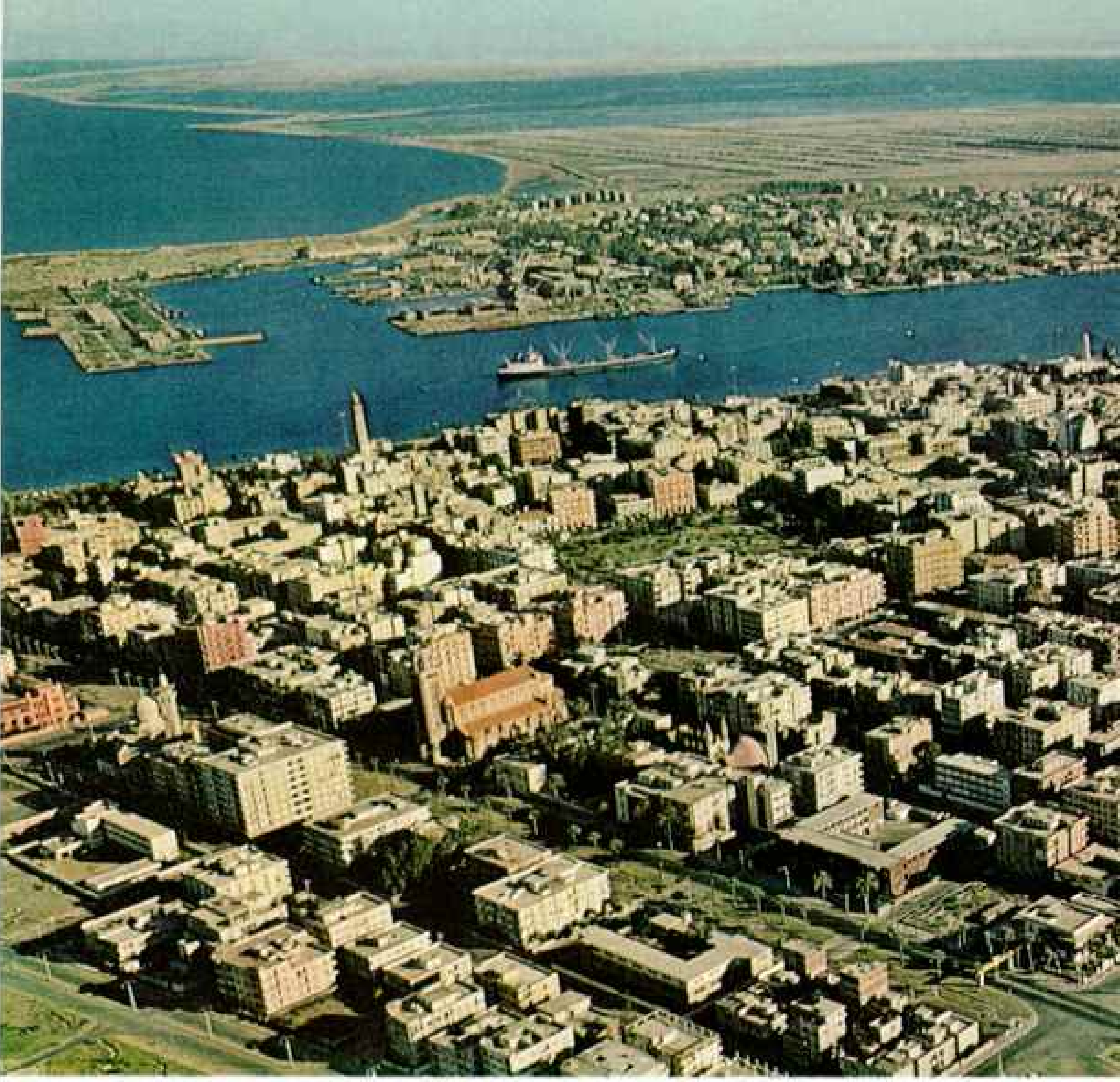
At the ceremonial opening, Empress Eugénie of France and other royal guests watched as Christian and Moslem leaders blessed the venture (**far right**). The next day they boarded a fleet for the inaugural passage, "acclaimed by teeming multitudes."

De Lesseps saw Suez as "an everlasting source of wealth for Egypt!" In 1956 the late Gamal Abdel Nasser nationalized the canal, and for a decade its tolls, as much as $227,000,000 a year, provided a major part of Egypt's foreign exchange.



ALL FROM "THE INAUGURATION OF THE SUEZ CANAL," BY MARIUS FONTAINE; ILLUSTRATIONS BY M. RIOU





Mediterranean gateway, Port Said revives as freighters off-load grain and fertilizer.

husband in the care of one of their children. Her decision probably saved his life.

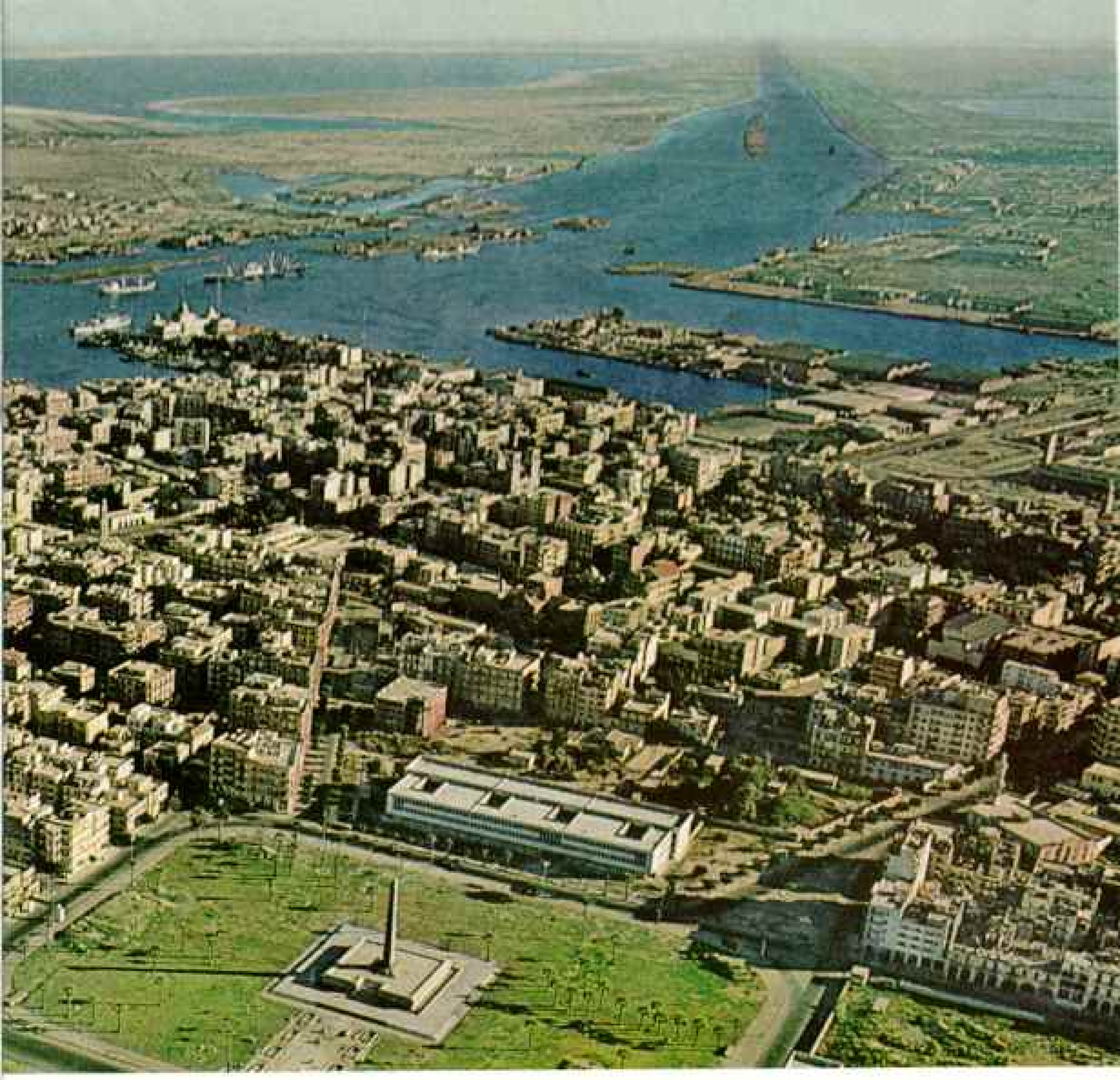
One afternoon several weeks later the room in which the Tawabs sat simply exploded around them, whether from a bomb or artillery shell they never learned.

"The roof began to collapse," Mr. Tawab recalled, "and I lost my direction. I realized I could not reach the door, and I thought the end had come. I called to my wife to run for safety"—he paused, smiling—"but she never learned the Moslem law of obedience. Instead she took me by the hand and somehow led me through the falling wreckage out into the yard. Allah was with us that day."

Elsewhere along the canal, faith took the form of endurance and devotion to things dimly recalled. One morning during a visit to an elementary school in the city of Port Said, I met Hoyida Mohamed, aged 11. She and her family had just returned home after seven years as refugees in a Nile Delta town 43 miles to the west.

Memory of Home Lives in the Blood

Hoyida's father, I learned, had been a bumboat vendor in Port Said harbor until 1967. When the six-day war abruptly put him out of business, he and his family fled the city along with 320,000 other inhabitants.



By early spring the canal (upper right) was clear of wrecks and awaited formal reopening.

The few thousand who remained behind lived anxiously as Israeli troops dug in a few miles away.

In the years that followed, Port Said lost all semblance of the once-thriving northern terminus of the canal. The harbor and waterway lay blocked by sunken ships and by the constant threat of attack from either side. Israeli artillery bludgeoned the waterfront, turning it into a honeycomb of ruin. Hunger, disease, and despair took their toll until Port Said became a derelict city. Yet all the while young Hoyida Mohamed yearned for home.

She had been barely 4 years old when she left Port Said. I asked how she could miss a place she hardly remembered. Her reply expressed the instinctive longing of refugees throughout the ages.

"When I was born," she replied gravely, "the first thing my eyes saw was Port Said. I was too young to know it then, but my father has always told me, 'Port Said is a drop of your blood. Never forget it.'"

By the summer of 1974, when Hoyida and her family returned home, Port Said had already begun digging out from under the ruins. While Egyptian crews demolished condemned buildings and cleared the streets of rubble, an American salvage firm concentrated on the canal.

Mariners going nowhere fought boredom aboard ships trapped since 1967 in the canal's Great Bitter Lake. Lured by extra pay, caretaker crews rotated on stints of three months or longer, guarding as many as 14 vessels. Crewmen lunching in the wardroom of the West German *Nordwind* (**left**) tapped cargo for their T-shirts. Others relaxed in the pool of the Swedish-registered *Killara*, moored to the Norwegian *Marit* for convenience (**right**).

In some holds fruit rotted; in others metals and wool appreciated in value. Ultimately the ships, which created a snarl of insurance claims, would reach Port Said or Port Taufiq, some of them destined for the salvage yard.

Using explosives and underwater cutting torches, divers began dismantling two scuttled ships that blocked the main channel. As a giant section of hull was cut free, a floating crane would lift it to the surface and add it to a grim montage along the canal bank. Despite safety precautions, several salvage workers had narrow escapes. In one bizarre accident inside the passenger ship *Mecca*, diver Richard Trautman found himself facing an underwater fire.

"I was caught for only a few minutes," Rich told me later. An expert oil-rig diver from New Orleans, he had completed salvage work in relatively deep water at Port Said and turned to another wreck, when I met him near the city of Suez. During a break in diving operations, Rich described the *Mecca* episode in matter-of-fact tones.

"I was working 50 feet down inside the ship," he said. "I used my normal diving gear, heavy plastic helmet with an air hose to the surface, and was cutting access holes through steel fuel-tank bulkheads with an oxygen-arc torch to reach the starboard side of the ship.

"I'd already cut through five compartments, and that gets a little cramped, because the access holes are only shoulder width and you're dragging these long hoses behind, one for you and one for the torch. It was in the sixth compartment that I ran into trouble." He shook his head at the memory. "I sure was some surprised."

Unnoticed by Rich at first, sparks from the torch rose to the top of the compartment in streaming bubbles of fire. As the bubbles reached air trapped at the top, they ignited a leftover film of fuel, spreading flames across the entire bulkhead. While 50 feet underwater, Rich suddenly found himself beneath a roaring canopy of flames.

"It came a bit sudden," Rich said, "but the fire didn't really worry me. What mattered was the danger of explosion—it can burst your eardrums, give you a concussion, or even kill you."

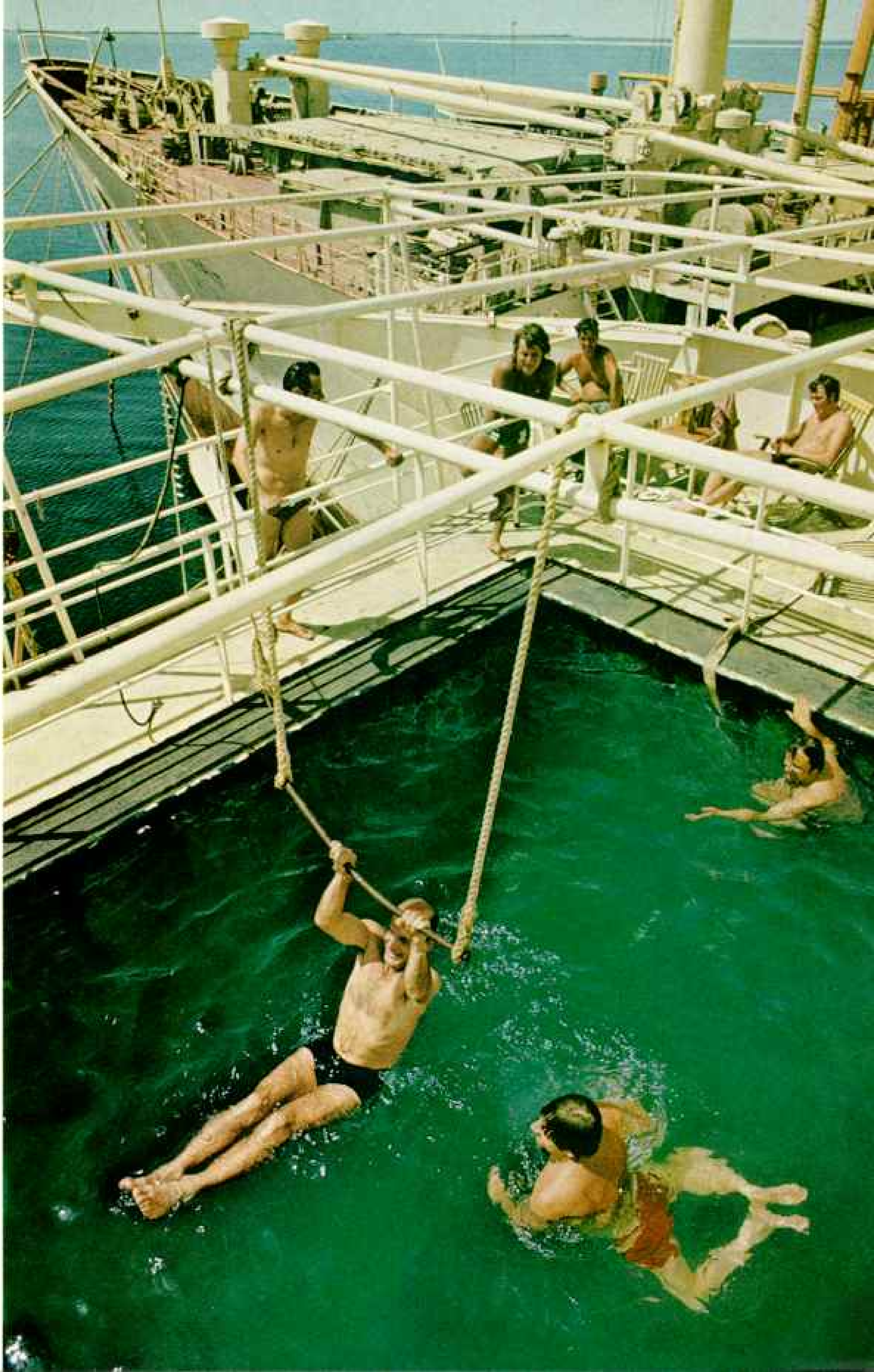
It was a horrifying vision. I asked how he had gotten out.

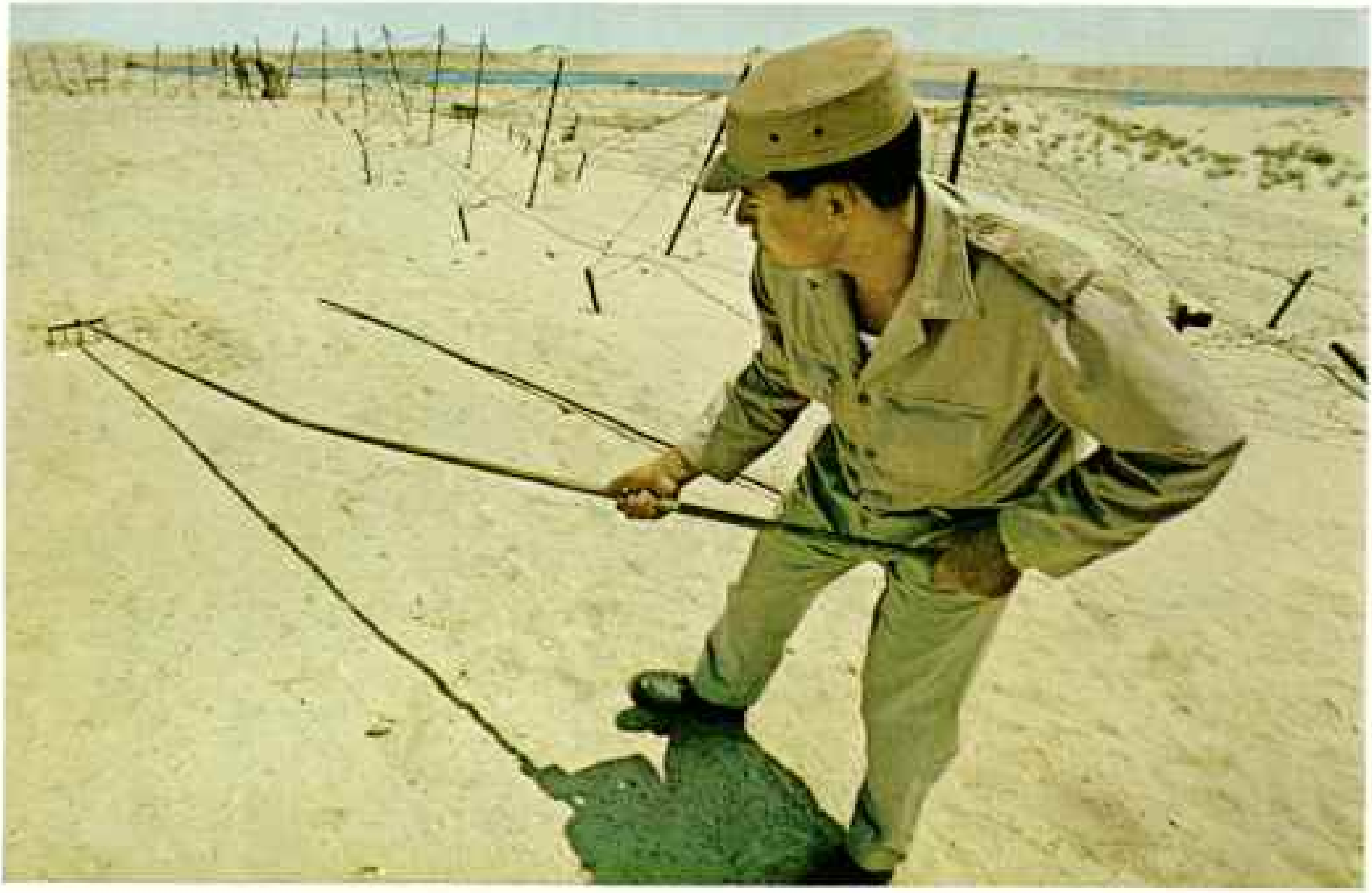
"I didn't, at least not right away," Rich answered. "I let the fire burn itself out. It only took a minute or two, but while it lasted it was one crazy sound-and-light show."

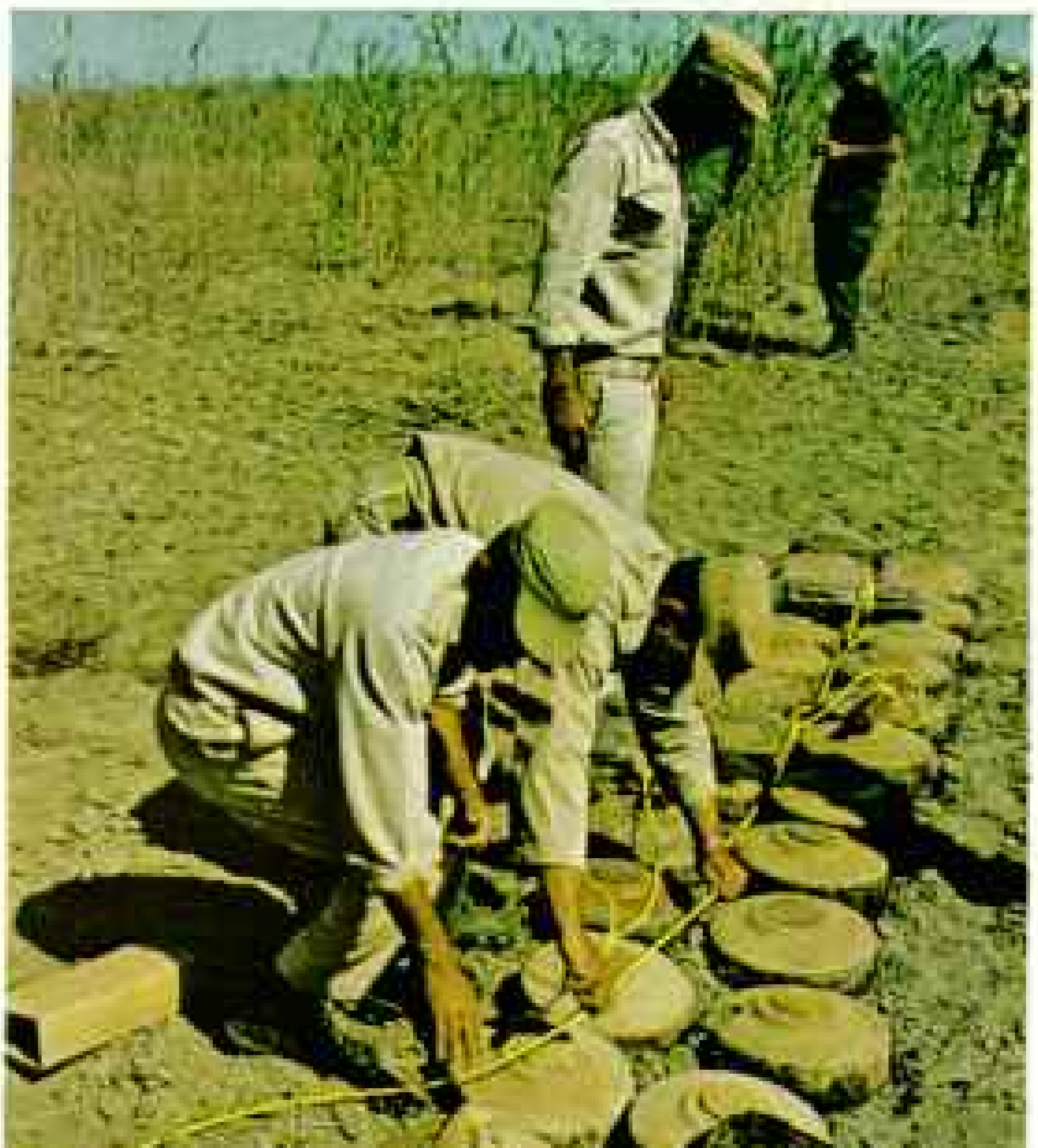
Clearing Operation Takes a Toll

For all the hazards of underwater explosives removal and salvage work, only one Egyptian lost his life during the entire clearing of the canal. Those ashore were less fortunate: In the hazardous job of ridding the canal banks of land mines, 100 Egyptian soldiers died. Over a period of three months, demolition teams found nearly 700,000 mines set by Israeli and Egyptian forces.

On an inspection of the area north of Suez city, photographer Jonathan Blair and I had a tragic reminder of the unwritten law along the canal: *"Walk only on paved surfaces or on footprints in the sand."* Not far from where we had inadvertently strayed beyond







Most deadly chore: As Egyptian Army engineers cleared both banks of the canal of nearly 700,000 mines last year, fatalities mounted to 100. Using a rake with a ten-foot handle, an officer (**above**) gently searches for baseball-size antipersonnel mines that explode under three pounds of pressure. He clears an island formed by El Ballah bypass (map, page 801).

On the island, Egyptians rig a detonating cord to less-sensitive antitank mines (**left**). A U. S. Army officer in green fatigues was one of 100 American advisers who trained Egyptians in removing various sophisticated explosives from many lands, some made in Egypt and Israel, others supplied to the warring nations by France, Great Britain, West Germany, Yugoslavia, the Soviet Union, and the United States.

Shielded by sandbags, an Egyptian (**right**) detonates antitank mines 200 yards away. The army moved other mines to create new fields farther from the canal as a defensive measure.

a narrow path that bordered the canal, two Egyptian soldiers were killed soon afterward by a mine.

During long years while the maritime world awaited readmission to the Suez Canal, a small percentage of it waited patiently to get out. In the lightning onslaught of 1967's six-day war, a northbound convoy of 14 ships was caught while passing through the waterway's Great Bitter Lake and dropped anchor until the transit could be completed. It would prove to be a wait of many years.

Marooned Sailors Dwell in the Past

With special permission, I paid a visit to some of the marooned ships. Dubbed the Great Bitter Lake Fleet, these vessels represented many nationalities—Czechoslovakian, Polish, Bulgarian, Swedish, West German, British, French, and Norwegian. An American ship, *African Glen,* had been sunk during the 1973 hostilities. She rested on the bed of the lake with her decks nearly awash, the victim of an Israeli attack.

In spite of their forlorn appearance, the surviving ships lacked nothing in the way of hospitality. Several lay anchored side by side, and I was welcomed in the wardroom of *Marit,* a 10,000-ton cargo ship registered in the port of Kristiansand, Norway.

Over ice-cold bottles of Norwegian beer, *Marit*'s chief engineer, Harry Jensen, and his colleagues explained that the original crews of the ships had long since been replaced by rotating maintenance teams who signed on for three-month tours of duty.

"It's not a bad life," Harry said. "We get shore leave in Cairo, and the ship has plenty of work for a dozen men, especially on the engines. When the time comes to leave," he added with a touch of pride, "*Marit*'s engines will be ready to run. She'll be seaworthy, like a proper Norwegian."

The ship's crew was being provisioned from Cairo and Alexandria. As for clothing needs, Harry confided, *Marit*'s cargo offered a wide variety.

I had begun to notice that my hosts' clothes, while obviously new, were slightly dated. Trousers seemed unfashionably baggy, belts a trifle narrow, and shoes somewhat pointed for today's tastes. I noted, too, several spotless T-shirts, each with a horseshoe emblazoned across the front, beneath the legend

Greeting the peacekeepers, President Mohamed Anwar el-Sadat of Egypt visits the United Nations Emergency Force at Ismailia. The men in blue berets were guarding the U.N. buffer zone in Sinai. President Sadat made the tour last June to inspect the recovered east bank of the canal.

"EXTRA KICK"—an oil company slogan of the mid-1960's.

Ironically, one item in plentiful supply throughout Egypt had to be shipped all the way from Scandinavia. As Harry saw me off at the gangway, his eye caught an unsightly patch of rust on deck.

"Nothing to do about it till our sand gets here from Norway," he remarked wryly. "Then we plan to blast it clean and do a little repainting."

With thousands of square miles of pure desert sand all around us, I looked astonished. Harry read my thoughts. "Too fine," he said. "The Egyptian sand won't work in our blasting machine—we had to order ten tons from home."

Preparations were under way for the luckless internees of Great Bitter Lake to weigh anchor and complete their long-delayed canal passage. *Marit* expected to sail out on her own, perhaps in company with a master mariner named Ahmad Kamal Hamza.

As senior pilot of the Suez Canal Authority, Captain Hamza oversees all traffic through the canal. Given the slightest excuse, he cheerfully abandons his office ashore and takes to the nearest wheelhouse.

I found Captain Hamza on one of his shorebound days, beset by paperwork at his headquarters in Ismailia. With an air of reprieve he pushed the pile of papers aside and proceeded to give me a veteran pilot's view of the canal.

Canal Pilot Training Takes Years

"War has cost us heavily," he began, "not just in the physical sense but in terms of people and experience. Officially we have 234 pilots on our rolls, but the majority have been on leave since the canal closed in 1967. A good many found jobs abroad, for Suez pilots are welcome anywhere. Merely to apply for a canal pilot's position you must have a shipmaster's certificate, and further training takes two to three years."

I had heard that all Suez pilots now were Egyptian, and Captain Hamza confirmed the fact. "But before the war," he said, "we were an international team—Egyptians, Russians, Americans, Poles, Dutch, and a good many Greeks and Yugoslavs. We hope some of the foreign pilots will return once the canal is in full operation."

On the subject of salaries, Captain Hamza said they depend largely on the individual. "A senior pilot in 1967," he explained, "earned 250 Egyptian pounds a month, or nearly $600 in your currency. In addition, he received $30 for each ship he piloted, and a good man could make as many as 25 trips a month. Top salaries averaged about $16,000 a year.

"Of course," he added, "the fees are bound to increase, for pilots are the heart of the system. In the old French-run Suez Canal Company, there was a saying: *'Le pilote, c'est un bijou; il faut le protéger*—The pilot is a jewel; he must be protected.' "

Even today visitors along the canal are cautioned to respect pilots at work. Beside the waterway near Ismailia stands a request to motorists in both Arabic and English:

AT NIGHT
AS SOON AS SHIPS ARE IN SIGHT
PLEASE TURN DOWN YOUR LIGHTS

Talk turned to expansion of the canal and future traffic. Recalling that in the last full year of operation more than 21,000 ships had passed through the waterway, I wondered how the figure would increase once expansion was completed.

To my surprise Captain Hamza replied, "Almost not at all. Expansion is aimed strictly at tonnage, to accommodate larger ships, but the number will change very little. Traffic, you see, is organized by convoys with a system of bypasses en route, so that no two ships ever pass each other under way.

"However much we widen the channel, we cannot change the pattern or increase the number by more than a few. The canal will never become a two-lane thoroughfare, for the risk of collision—and therefore blockage—is simply too great.

"You have seen what it takes to raise one 6,700-ton ship at Port Said. Imagine the nightmare of two 300,000-ton tankers sunk side by side in the canal!"

Even lesser damage to a single ship can paralyze traffic. Such a mishap occurred in 1954, and incidentally gave Suez pilots a rare holiday.

"It happened at the end of the year," Captain Hamza recalled. "We were heading north in a nine-ship convoy when the Liberian tanker *World Peace* rammed the railroad swing bridge near El Firdan and drove a span of the bridge into her superstructure. I was piloting one of the ships astern, and we all followed standard emergency procedure,

instantly tying up to the bank of the canal.

"With a freighter," he continued, "the problem would have been bad enough, for the only way to free the ship was with cutting torches. But *World Peace* carried thousands of gallons of crude oil in her tanks; one spark in the wrong place would have meant a holocaust."

With infinite care a team of welders cut the tanker free, leaving a section of the bridge extending outboard on either side, enabling *World Peace* to limp north to Port Said. The job took several days, and during that time traffic came to a virtual standstill along the 100-mile canal.

"The accident occurred on the morning of December 31," Captain Hamza concluded. "There was nothing for the pilots to do, so we all went ashore. Normally, the canal operates 365 days a year, with a percentage of pilots always on duty. I think it was the only time in nearly a century that all of them celebrated New Year's Eve ashore."

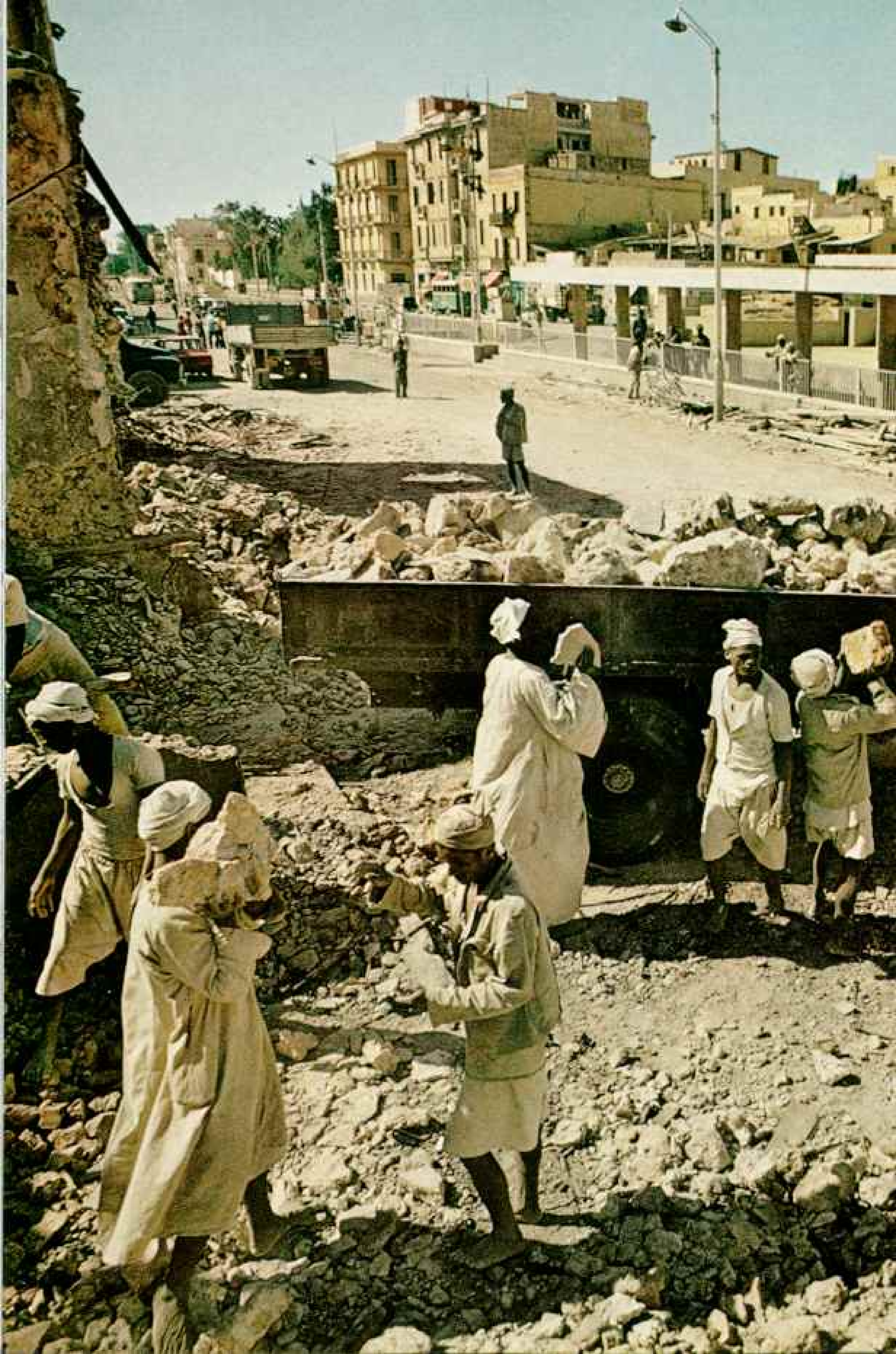
The bridge near El Firdan no longer threatens ships, for it was extensively damaged in the war of 1967. The rail line running from the canal across Sinai was abandoned following the 1967 hostilities. The only canal bridges remaining were pontoon structures maintained by the Egyptian Army. Despite the inconvenience to ships, which were forced to wait while the bridges were slowly opened, the army refused to give them up for strategic reasons.

Three Conflicts Left a Sea of Debris

One morning, with a group of other journalists, I crossed a pontoon bridge under Egyptian military escort to inspect the east bank and the desert of Sinai beyond. It was here that three wars had reached a crescendo of fury and that the intermittent exchange of artillery fire and aerial bombardment had resulted in appalling destruction.

Although bare of deserted villages and colossal ruins such as the cities of Port Said and

Raising a storm of dust, Egyptian tank commanders direct their 40-ton Soviet T-62's during maneuvers in Sinai, one of history's oldest battlefields. On October 6, 1973, some 500 tanks and 8,000 Egyptian infantrymen launched a lightning assault across the canal and began to overrun Israeli bunkers like this one beyond the rusting antiaircraft gun (**below**). Under terms of the 1974 accord, Egypt kept as many as 7,000 men and 30 tanks in its 7- to 10-mile strip along the east bank of the canal. Jubilant Egyptian civilians came by the busload to stand on the Bar-Lev Line.



Suez, the east bank nonetheless bore fearful scars of conflict (page 813). Where the Bar-Lev Line's continuous ridge of sand once dominated the canal, there remained only shattered bunkers, empty gun pits, and great slabs of reinforced concrete strewn about like piles of discarded shingles.

Fire Hoses Become Surprise Weapons

Unable to breach the line by conventional means, Egyptian assault engineers hit on a novel technique. One early morning in October 1973, they slipped across the canal with pumps and ordinary fire hoses, and washed away the rampart of sand between Israeli strongpoints, allowing tanks and infantry to pour through the gaps. Demolition teams later destroyed the abandoned defenses to prevent their reuse against Egypt.

At the time of our visit the United Nations buffer zone lay some ten miles east in Sinai, but for security reasons we were permitted a look at only the first six. The view was nonetheless grim, a sweeping panorama of rolling dunes endlessly flecked with the debris of combat. On every side stood clusters of burned-out trucks and troop carriers, the tortured shapes of wrecked artillery, and nearly a hundred charred and disabled tanks.

The sight called to mind Harry Jensen and his problem with rust aboard the freighter *Marit*. Under the lash of desert winds, Egyptian sand does a highly efficient job, scouring not only paint and rust but also the steel beneath it to a dark luster befitting the forlorn remnants of war.

Several members of our group were anxious to photograph a disabled tank, and our Egyptian hosts became strangely solicitous. Time and again a likely prospect was rejected for fear of surrounding minefields, for poor composition, or simply for "security reasons." It dawned on me slowly that the tanks in question were all Soviet-made and therefore Egyptian losses. At length our

Picking up the pieces, laborers clear shattered buildings near a surviving railroad station in the city of Suez. Rubble will rebuild the causeway to Port Taufiq. Southernmost of canal cities, Suez was destroyed largely by Israeli guns and planes. Now its 270,000 residents trickle back and begin the costly task of rebuilding.

army officer escort stopped the bus and with a sweeping gesture indicated his choice of an appropriate subject—a battered U. S.-built Israeli tank conveniently positioned in the middle of the road.

Glimpsing the Canal of the Future

Slowly, amid fragile hopes for peace, tanks and artillery were giving way to other machines in the canal zone. The new lords of the desert were the bulldozers and draglines of Osman Ahmed Osman (page 796). Formerly chairman of the Arab world's largest construction company, Mr. Osman now serves as Egypt's Minister of Housing and Reconstruction. In fact, he is the country's chief developer.

During my stay in Egypt Mr. Osman was constantly abroad, conferring with fellow Arab ministers on plans for development of the entire canal zone. I talked one day with one of his advisers, Ali Salem Hamza, no relation to my friend the chief pilot.

"We are thinking in terms of the next 25 years," Mr. Hamza began, unrolling a schematic diagram of the canal region. At first glance I hardly recognized it, for there was little to suggest present conditions.

Where thousands of square miles of desert now fringe the waterway, the diagram bore large areas shaded in green, representing land to be reclaimed or irrigated. The canal's three metropolitan centers—Port Said, Ismailia, and Suez—appeared trebled in size, with housing, new industry, free-trade zones, and tourist facilities to match. Finally, the army's cherished pontoon bridges had been replaced by five modern two-lane tunnels beneath the waterway (map, page 801).

It was an ambitious scheme and obviously an expensive one. Mr. Hamza acknowledged the high price.

"We estimate costs between seven and eight billion dollars," he said. "Financing will be provided partly by our own government, and the rest from abroad. Some of our Arab allies have already offered a share of their growing oil revenue, for the project will benefit them as well as Egypt."

With the Middle East then precariously balanced between peace and war, I brought up the matter of risks. What guarantee did Egypt have of launching the plan, much less of completing it?

"None," Mr. Hamza replied bluntly, "but we feel that the plan itself is an incentive for peace. No country would make such an enormous investment if it were convinced that another war were inevitable.

"Then, too, with the scope of modern weapons, the canal zone has lost some of its strategic value. When rockets can deliver warheads hundreds of miles with pinpoint accuracy, Cairo has become as much a front line as the Suez Canal."

Builder's Dream Again Seems Possible

I left the canal zone soon afterward with Mr. Hamza's words in mind. On a final flight aboard a U. S. Navy helicopter from Ismailia to Port Said, I had a superb view of the northern half of the waterway. To the west there were still the ominous silhouettes of the Soviet-built missile sites and occasional concentrations of tanks and mechanized infantry ready for instant action.

Eastward in Sinai the forlorn remnants of past wars darkened the gleaming slopes of dunes like a faint sprinkling of soot. One could only wonder whether their number would swell in the future with tragic additions by both sides.

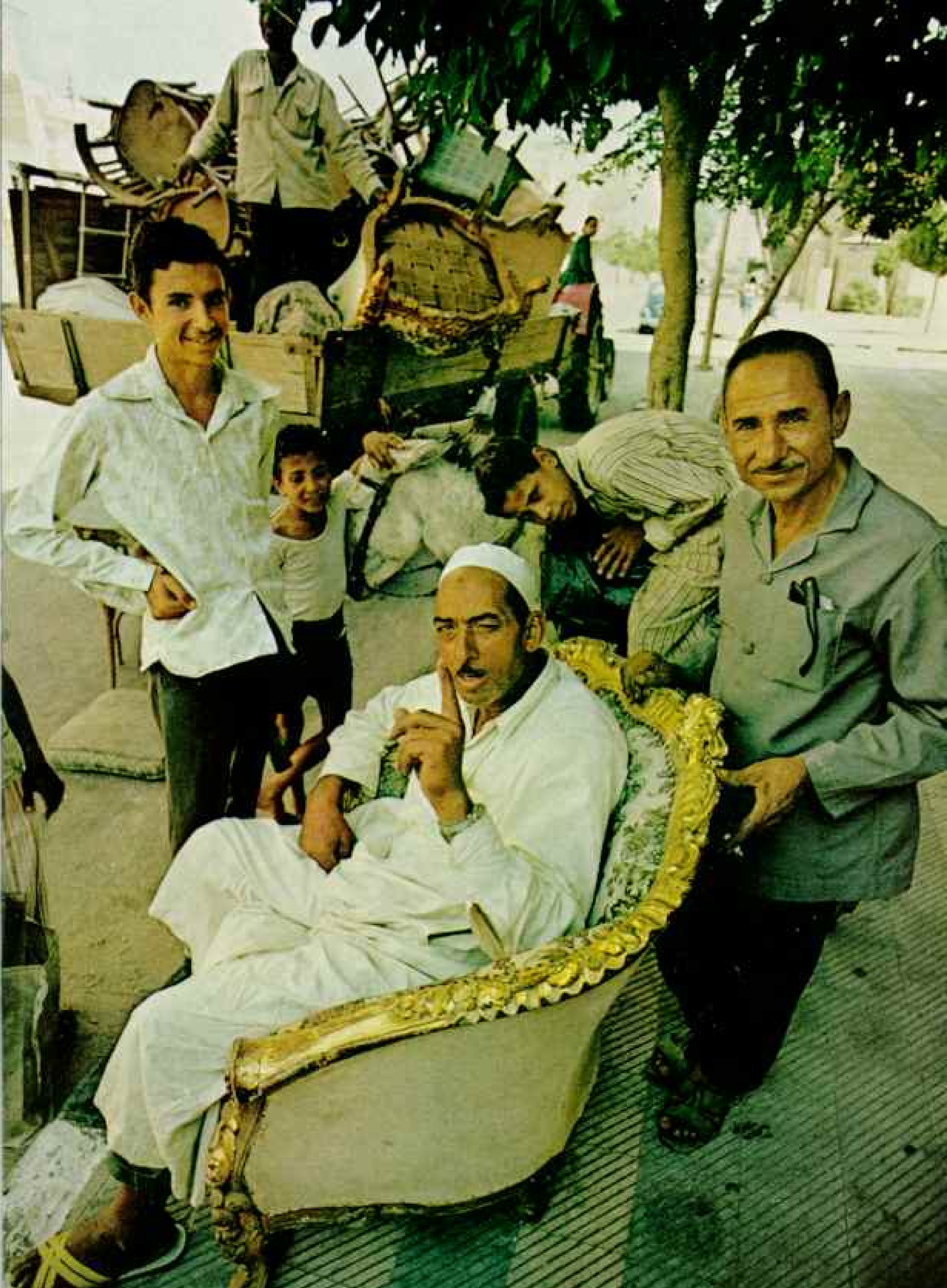
We reached Port Said then and began letting down over the broad harbor, cleared at last and astir with the arrival of four new ships beside the remains of those that had been scrapped.

They were small Egyptian vessels preparing for a trial run through the canal, a peaceful transit after more than seven-and-a-half years of hostilities. It was a heartening sight, symbolic of Ferdinand de Lesseps' original concept of the Suez Canal.

Envisioning the great waterway as a historic link among nations, the French builder and engineer had adopted a Latin motto whose message still expresses a measure of hope:

"*Aperire terram gentibus*—To open the world to mankind." □

We have returned. A family moves household furniture back to Ismailia after a seven-year absence from the breezy canal city noted for its French architecture and luxuriant gardens. More than a million Suez Canal residents fled to live with relatives or at government centers. After the Israelis withdrew last year, the displaced Egyptians began to come home.



By WILLIAM F. HERRNKIND, Ph.D.
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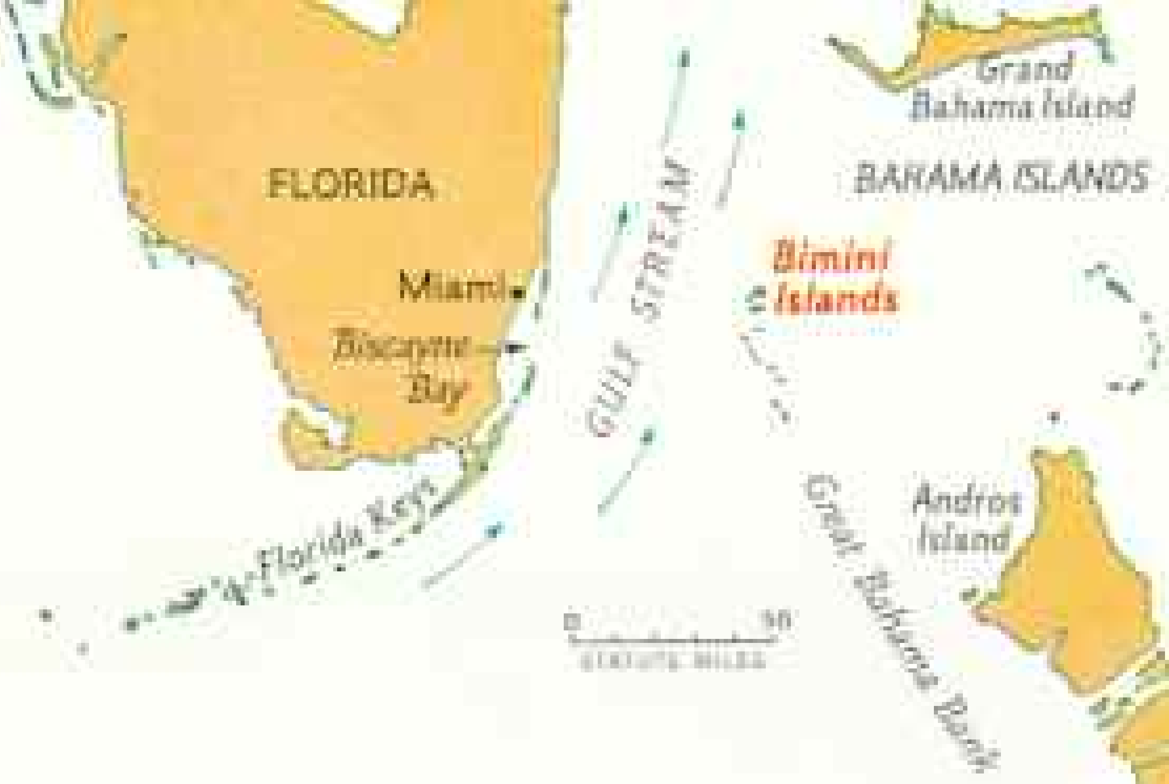
Photographs by
RICK FREHSEE and
BRUCE MOUNIER



Strange March of the Spiny Lobster

A PRICKLY FOREST of legs and feelers seethes under a rock ledge 25 feet down in the warm Gulf Stream washing the Great Bahama Bank. Spiny lobsters—hundreds of them—cram a single den no bigger than a pool table. Slowly, several leaders emerge, drawing others into bustling podlike clusters. Gradually the pods string out into lengthening files....

Then it begins: a relentless head-to-tail march, a mysterious impulse that drives these crustaceans day and night for miles along the sandy, unprotected shallows. Trailing one column of 11, I use a tail snare (**left**) to capture, examine, and tag specimens.

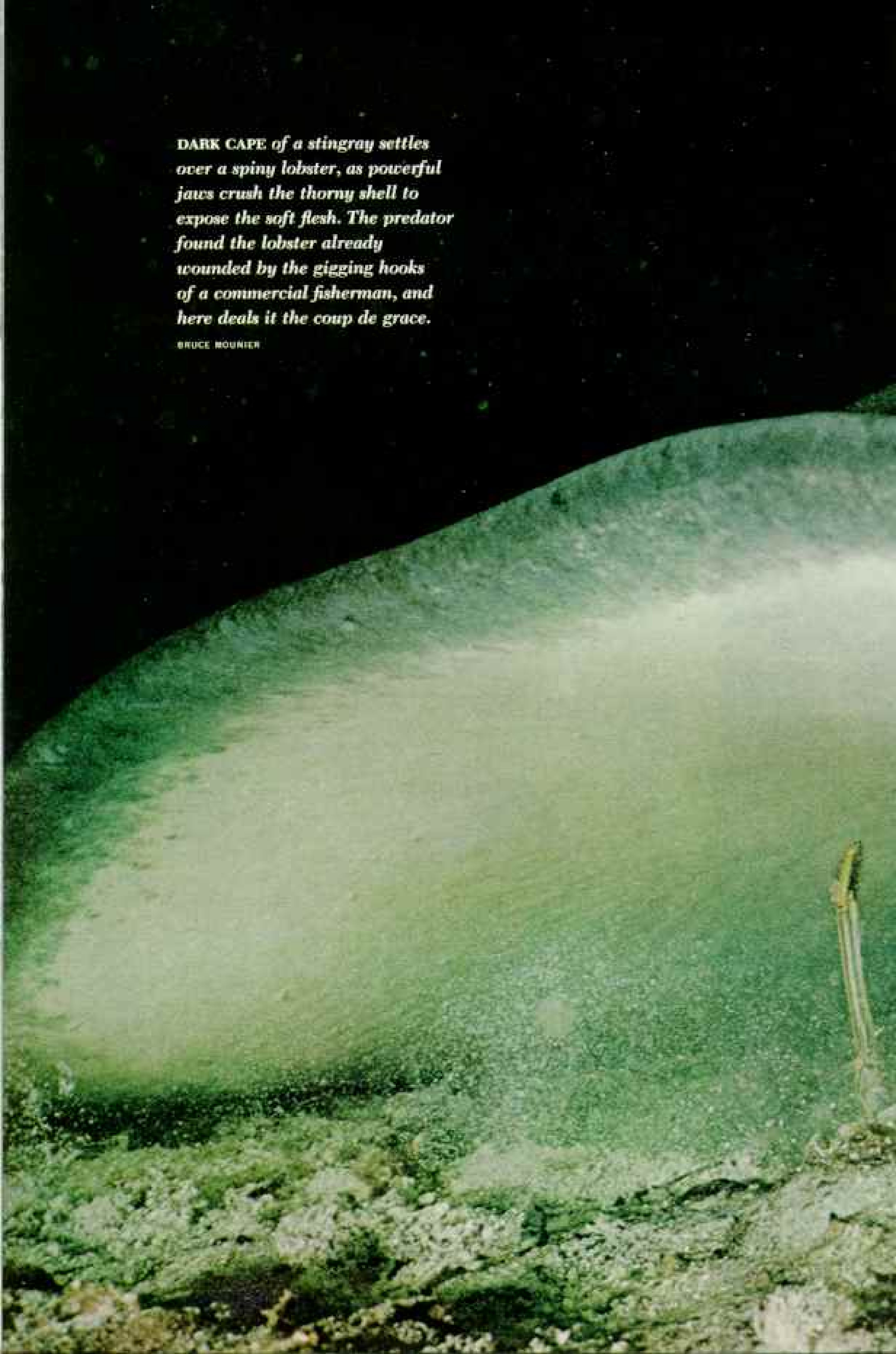
Once I accidentally dived onto a lobster "superhighway" during the crustaceans' fall migration, just west of Bimini (map, above). They passed me in parallel lanes, in perfect formation, making turns as if on rails. As a scientist, I saw row upon row of questions: Where did they come from? Where were they going? Why?

RICK FREHSEE

To find out, I organized "SLURP" (Spiny Lobster Undersea Research Project) in 1969 with scientists Paul Kanciruk and Joseph Halusky at Florida State University. Partially supported by a National Geographic grant, we began probing the enigmas of the spiny lobster, *Panulirus argus*.

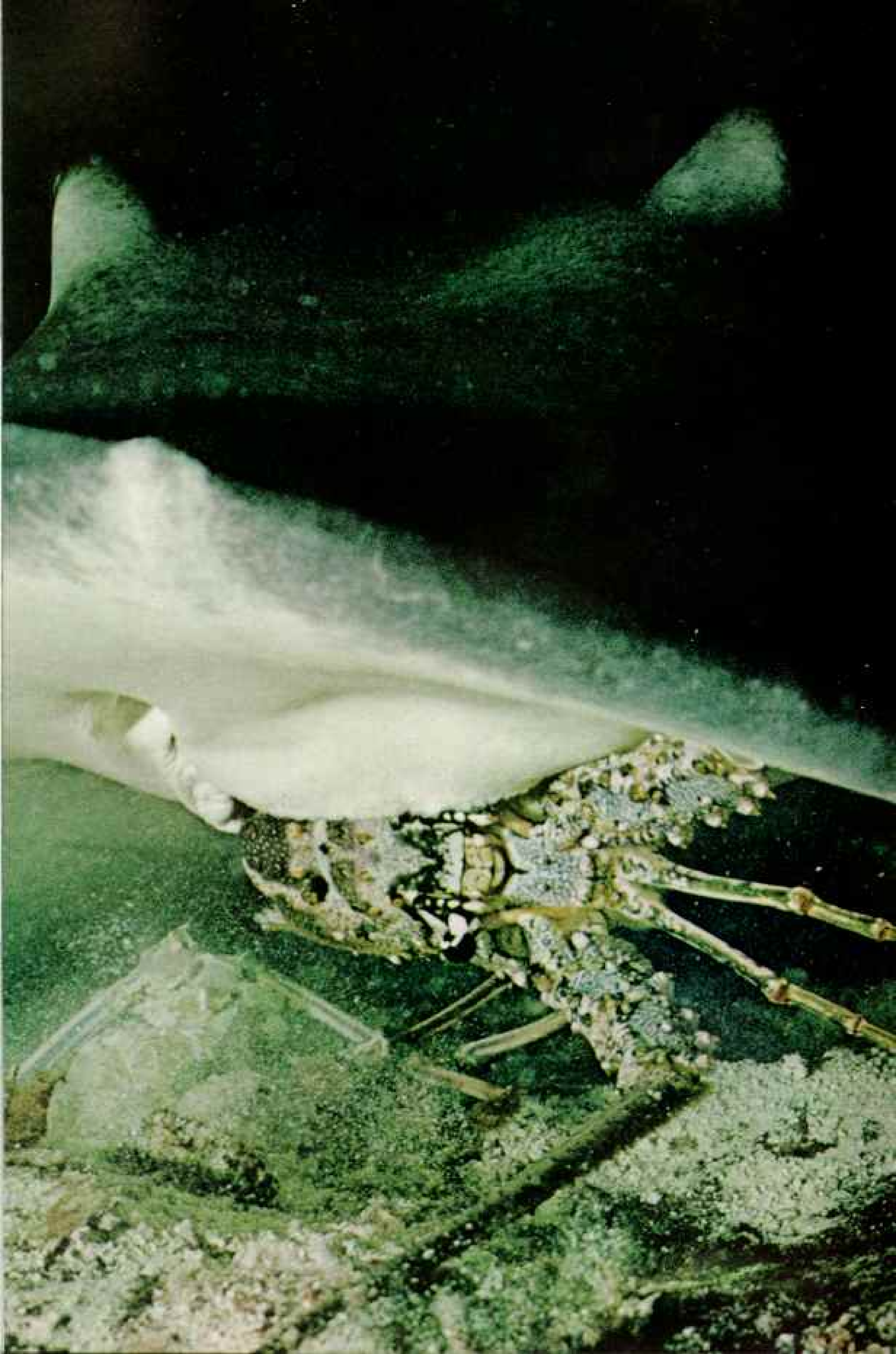
We focused on the Bimini area, studying queues from 2 to 65 animals long. Often triggered by hurricanes or autumn squalls, such migrations have been reported in the Caribbean and Bahamas, and off Florida.

Unlike their distant northern relative, the American lobster *(Homarus americanus)*, clawless spiny lobsters migrate en masse—and seem to know exactly where they're going. The workings of the internal navigation system that may have saved this species from extinction still defy explanation. To imagine the spiny lobster's uncanny sense of direction, think of walking a direct course without a compass several miles through hilly country, in a dense fog, while strong winds buffet you.

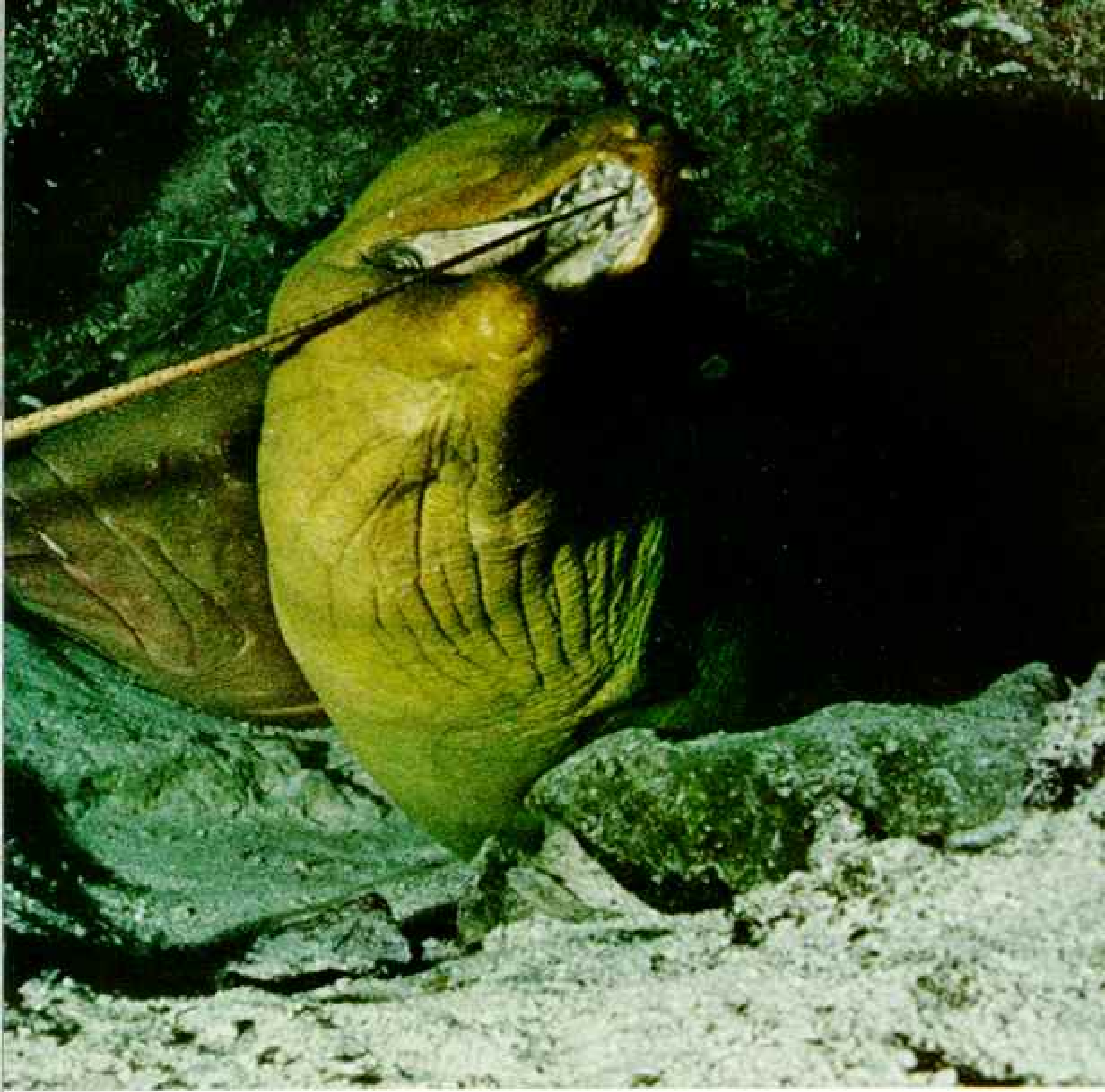


DARK CAPE *of a stingray settles over a spiny lobster, as powerful jaws crush the thorny shell to expose the soft flesh. The predator found the lobster already wounded by the gigging hooks of a commercial fisherman, and here deals it the coup de grace.*

BRUCE MOUNIER



RICK FREHSEE AND BRUCE MOUNIER (BELOW)



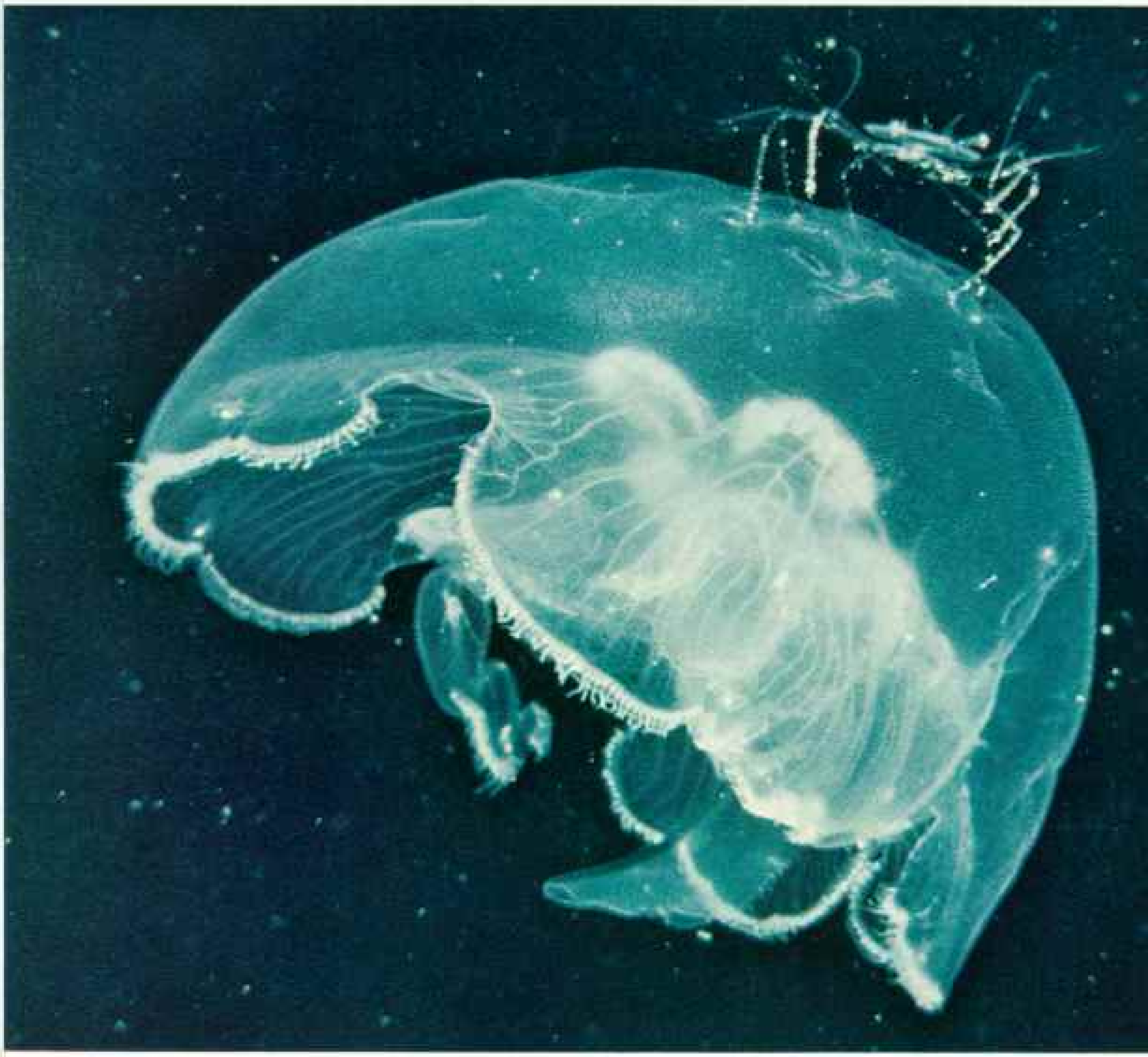
TOUCHÉ! Cramped quarters breed contempt: A lobster uses its two-foot antenna like a rapier to fend off a moray eel that shares its den (**above**). Like the lobsters' shells, the heavy antennae—their main defensive weapons—bear hundreds of tiny forward-pointing spines that give the crustacean its name. The vicious moray and the unassuming lobster make strange bedfellows. Eels sometimes seem to guard their den mates against marauders like the Nassau grouper; here one rests behind the moray as a bystander to the quarrel over living space. Lobsters also dwell in peril of sharks, jewfish, queen triggerfish, and octopuses.

In turn, the spiny lobster's favorite dishes include clams (**far left**). This pint-size lobster's eyes may be bigger than its mandibles, into which it wedges its potential meal to crack the shell, as the mollusk clams up for dear life. Another lobster (**left**) gobbles a mouthful of sea cucumber, a sluggish, knockwurst-shaped bottom dweller; some species are distasteful, if not toxic, to lobsters and other predators.

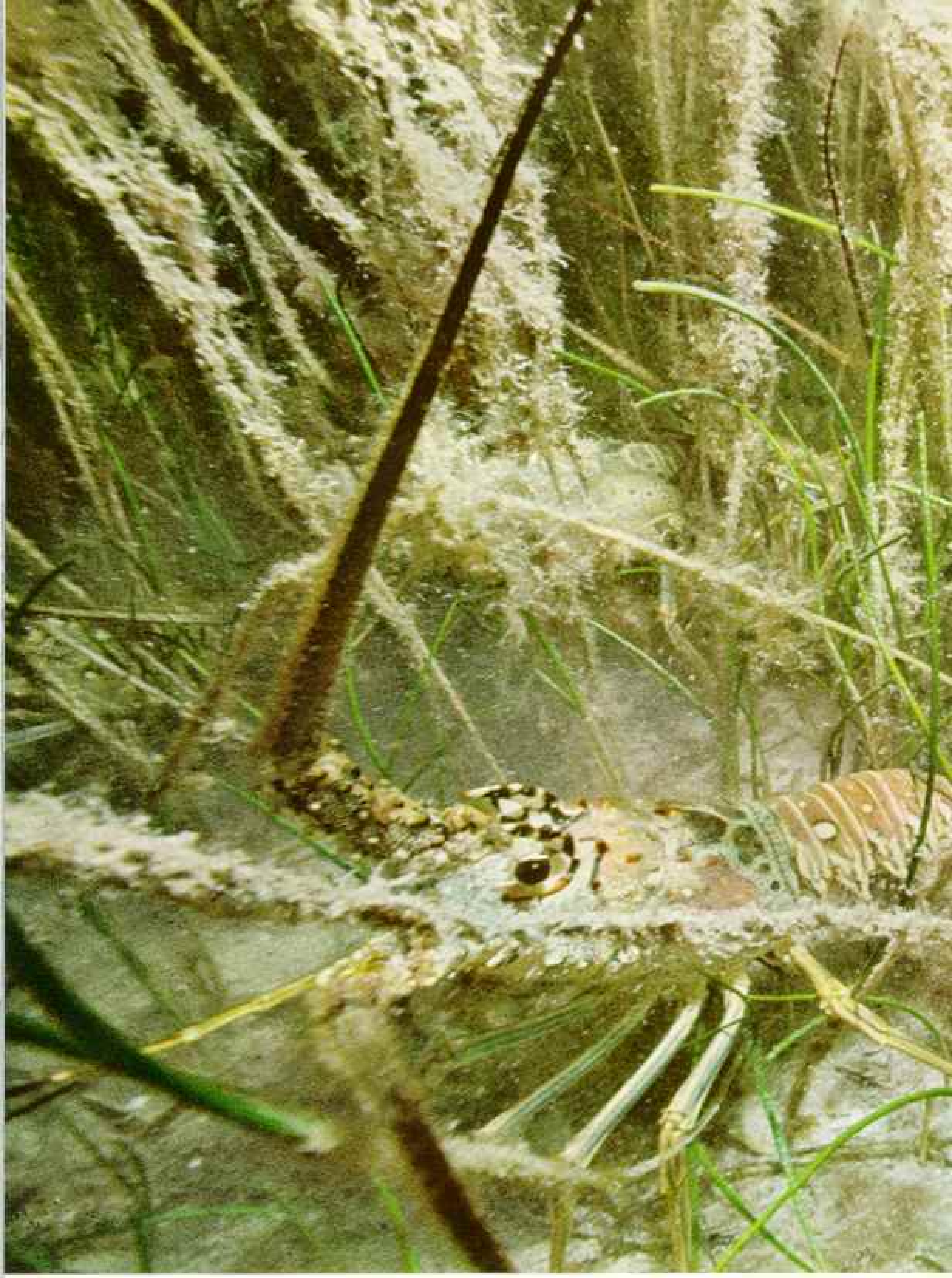
Spiny lobsters taste with their feet, sensing their prey with chemically responsive receptors on their ten legs. Feeding also on hermit crabs, sea urchins, conchs, and starfish, they may carry morsels with them, munching as they march.

BRILLIANT ORANGE EGGS mark the beginning of the spiny lobster's complex life cycle (**right**). At the base of this female's outstretched leg, her mate's spermatophore, white and waxy at first, now lies eroded after the live sperm fertilized as many as two and a half million eggs. Emerging from oviducts on her third legs, the eggs passed over the spermatophore to incubate under her tail. Females aerate and clean the egg mass by stroking it with their legs and flexing their abdomens; two to three weeks after the spring mating, the offspring hatch into luminous, jewel-like larvae, called phyllosomas, about 1/4-inch long (**below, right**). Drifting with the currents and feeding on plankton, the few phyllosomas that survive may molt as many as 11 times to become post-larvae (**far right**). Flecks of color begin to appear beneath the translucent external skeleton of the infant lobster, as it takes on adult form and settles to the bottom, molting less and less frequently.

Hitchhiking cousins of spiny lobster phyllosomas—the larvae of the shovelnose lobster, genus *Scyllarus*—frequently grab a free ride on plum-size moon jellyfish (**below**). Besides transportation, the jellyfish also provide protection against predators who shun their sting; the larvae seem to be immune.



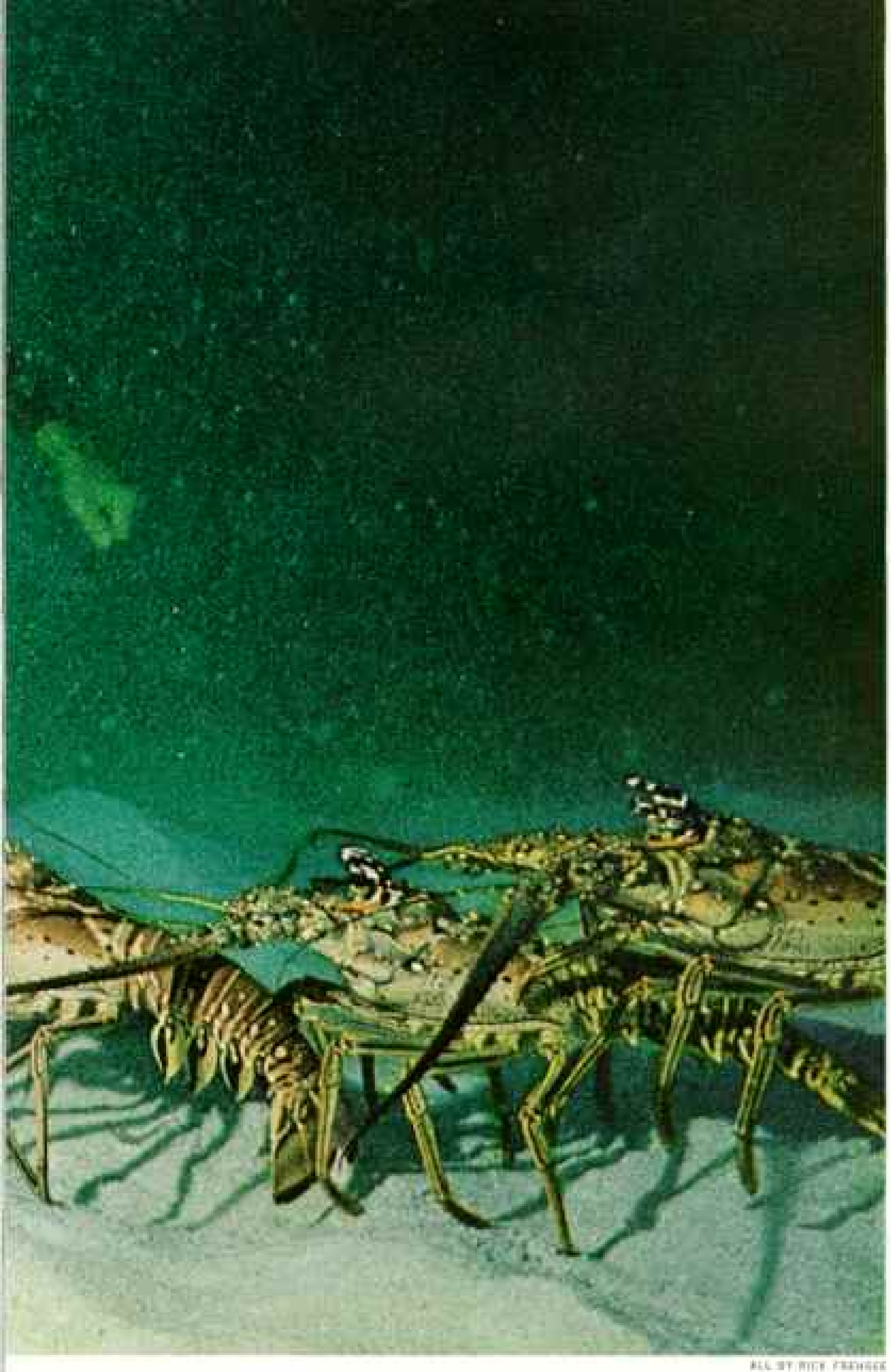
JOSEPH HALUSKY (BELOW LEFT) AND BRUCE MOUNIER



Camouflaged amid a meadow of sea grass, young lobsters creep through the shallows of

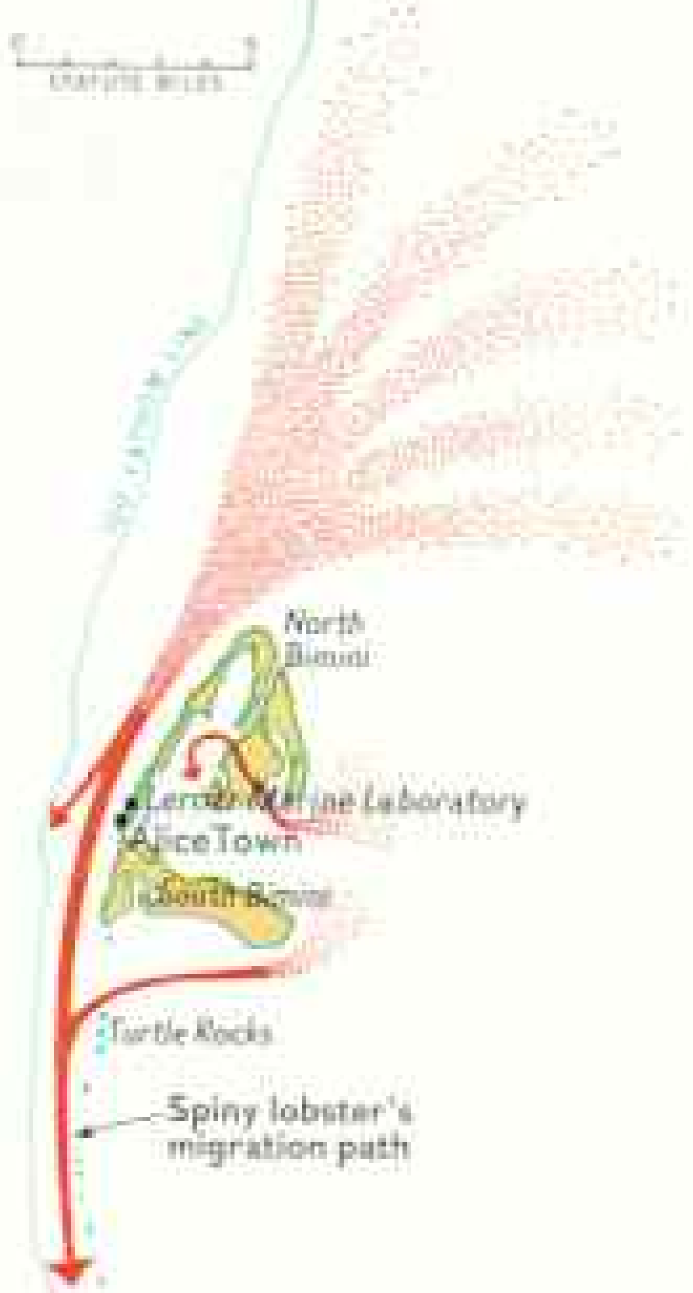
BRUCE MOUNIER

Florida's Biscayne Bay. Such coastal waters often serve as nurseries for the juveniles.



ALL BY RICK FREHSEE

"STACKED LIKE CORDWOOD," said Rick Frehsee, photographer for the SLURP team, of a crush of lobsters under a shelf off Bimini at dusk (**left**). Within minutes, they queue into a night march, scuttling past me in lockstep (**above**). The animals make initial contact with their long antennae; they keep aligned by touching their shorter inner antennules to the tail ahead—often hooking their front legs around it. Gluing a transmitting "saddle" to a migrant's shell, I prepare to track the creature with a directional receiver (**above, right**). In a week Bimini lobsters may move as far as 50 miles, heading almost due south across a mile-wide plateau formed by the islands and the western edge of the Great Bahama Bank (**map**). Primarily nocturnal, these lobsters are all but unstoppable while migrating. When we transferred one group to a vinyl pool at Bimini's Lerner Marine Laboratory, they marched around it day and night for two weeks!


STATUTE MILES
North Bimini
Lerner Marine Laboratory
Alice Town
South Bimini
Turtle Rocks
Spiny lobster's migration path

BOY-SIZE BEHEMOTH: A hoary ten-pound lobster caught by Bruce Mounier, a commercial fisherman and photographer, off the Anguilla Cays near Cuba is held aloft by his 9-year-old son, Bruce, Jr. (**below**). Even bigger giants may reach 20 pounds and live as long as 25 years.

To fishermen, the mass marches of the spiny lobster often mean windfall profits. The lode of lobsters at right, just a few of some 2,000 encrusting a coral head, was found 200 miles southeast of Bimini. Lobstermen from Florida, the Bahamas, and Cuba have long harvested such beds with bully nets, snares, or gigging hooks, though conventional lobster traps account for the lion's share of the total haul. Today in Florida alone the catches—destined, with drawn butter or mayonnaise, to delight gourmet palates—bring some 15 million dollars a year. Increasing numbers of fishermen, however, are threatening the state's lobster population; in the Bahamas the crop is already declining. Florida and the Bahamas impose strict regulations, but no one controls lobstering in international waters.

BRUCE MOUNIER (ABOVE) AND RICK FREHSEE

For years, though few landlubbers have believed them, lobstermen have spun ghostly tales of the "runs" of their quarry. "After Hurricane Betsy in 1965, lobsters swarmed across the Bahama Bank like a locust plague," Bruce Mounier recalls. "The lighthouse keepers at Lobos Cay, 20 miles from Cuba, still talk about the march there in '62. There were so many that the group spilled out of the water onto the rocks."

In the wake of these lobster caravans, a trail of mysteries remains. As yet, we're not certain of the animals' precise origin and destination. However, autumn's waning daylight appears to be a factor that catalyzes the Bimini migrations we have observed.

One result: population redistribution to new feeding grounds and possibly new breeding grounds too, since all the migrants we saw were sexually mature or soon would be.

But the inner drive itself, I think, may well be an evolutionary holdover, a living echo from glacial periods, the last some 10,000 years ago. To survive the much colder waters, perhaps the lobster had to find a warmer seasonal habitat—or perish. By retaining that urge today, in an interglacial period, it may thus be prepared for the next ice age. Though this theory needs further study, we may be witnessing a walking undersea quest, to the tick of not only the spiny lobster's own life cycle, but the earth's as well. □

ANDALUSIA

THE SPIRIT OF SPAIN

THERE ARE SIX OF THEM and they have a name like a poem—*los Campanilleros de la Aurora*, the Bell Ringers of the Dawn. You can find them at 4 o'clock any Sunday morning in the streets of Arriate, an Andalusian village of 4,000, lost somewhere in the mountains between the Sierra Morena and the sea.

As they have for perhaps a thousand years, the campanilleros drift out of the purple night to the sound of bells, cymbals, and a guitar. They pause before the dwellings of those who have given alms and sing anthems older than memory to Arriate's patron, the Virgin of the Dawn.

Twice I joined the campanilleros on their rounds. They shared their flask of *anis,* a fiery licorice-flavored liquor that protects them from the predawn chill. Who are they? A barber . . . a teacher . . . a blacksmith . . . a cobbler . . . a farmhand . . . a wine merchant. Why do they serenade the sleeping village?

"Because, *hombre,*" the barber said over an Andalusian breakfast of fresh warm bread dipped in olive oil, "this has always been done. Arriate is a very old town, but even before it existed our forefathers were campanilleros. We must continue the tradition."

A reverence for tradition, I found, pervades virtually every aspect of life in Andalusia, Spain's southernmost region (map, page 838). "We treasure the old ways," explained a Sevillano, "because they express accumulated wisdom. In this plastic age, where else can you search for mankind's soul?"

Despite their high regard for yesterday, Andalusians live primarily for today and totally ignore tomorrow. "In my own town," said a friend in Ronda, "unemployed men wait outside stores for delivery trucks. They unload them for two hours, perhaps three—however long is required to earn enough to live through the day. Then, no matter what premium pay is offered, they quit. For if three hours' wages will support an Andaluz, he will not ruin his day by working four."

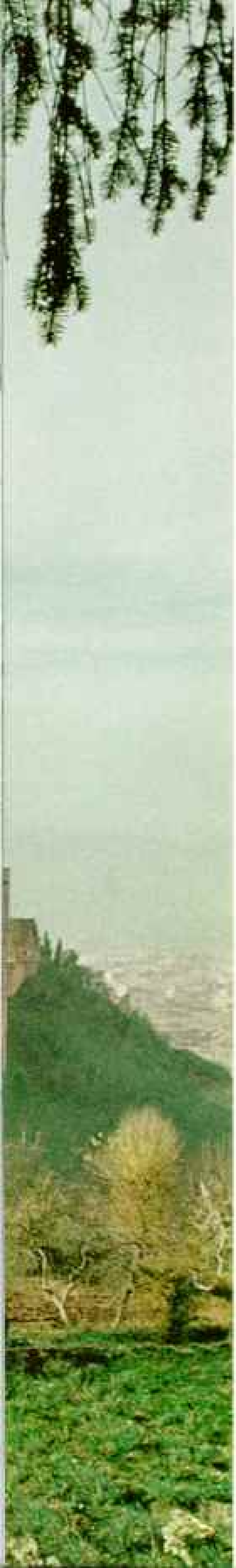
To a foreigner, Andalusia represents the essence of Spain. The bullfight, that ritualized drama of dominance and death, was born here, and so was the stark grief of flamenco. Andalusians gave the guitar its familiar form, and no one can match the darkling passion of the Gypsies who play it in towns like Morón and Utrera and Carmona. In the 34,000 square miles of Andalusia I found an incredible

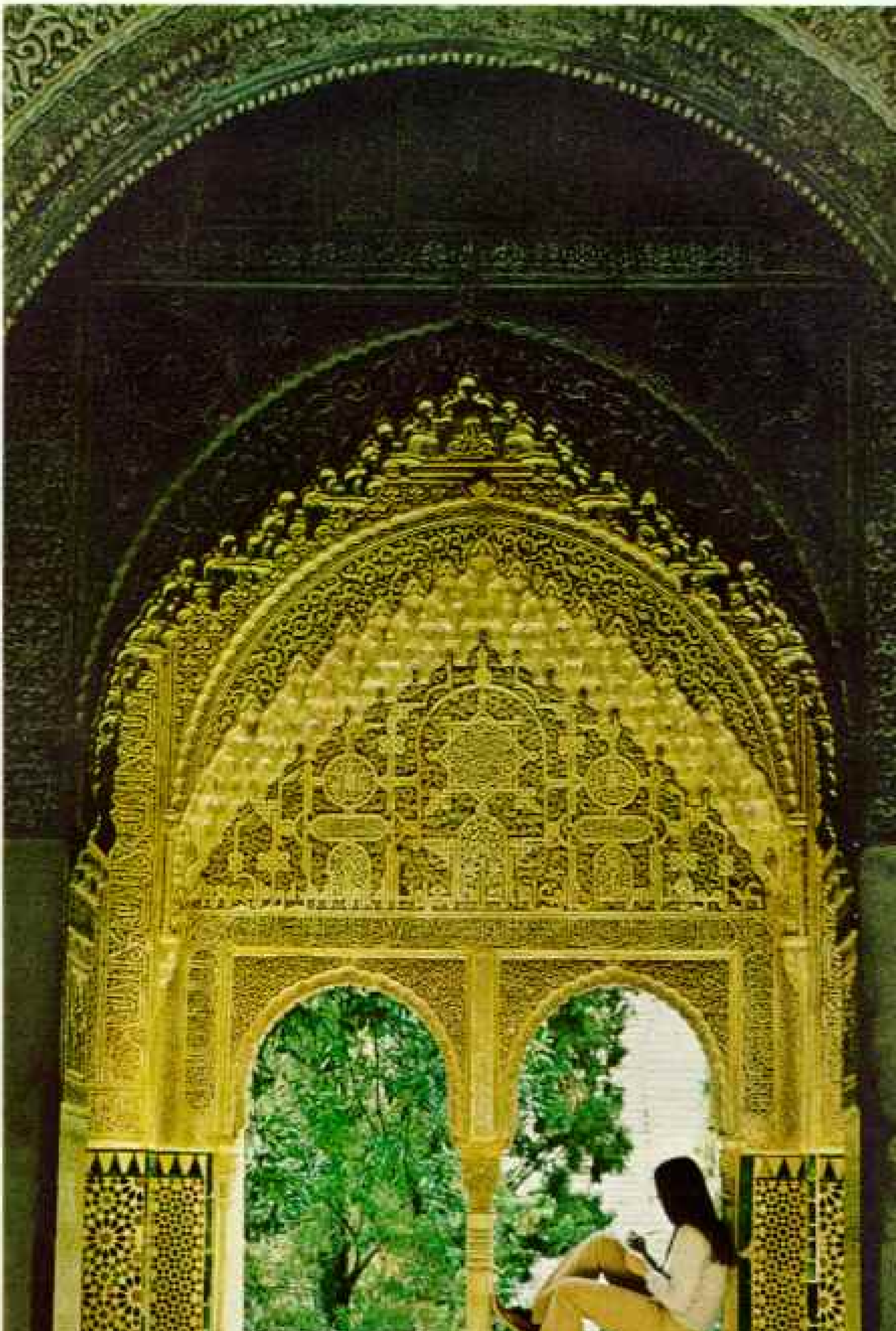
(Continued on page 838)

Somber in dress, vital in spirit, a woman of rural Montejaque stands in the doorway of her thick-walled whitewashed house—a reminder of Moorish influence in Andalusia. In Spain's southern land of contrasts, Catholicism overlies a Moslem heritage, lush fields abut barren uplands, and the Andalusians themselves wear a mood sometimes gay, sometimes melancholy.

By HOWARD LA FAY
FOREIGN EDITORIAL STAFF

Photographs by
JOSEPH J. SCHERSCHEL
NATIONAL GEOGRAPHIC PHOTOGRAPHER





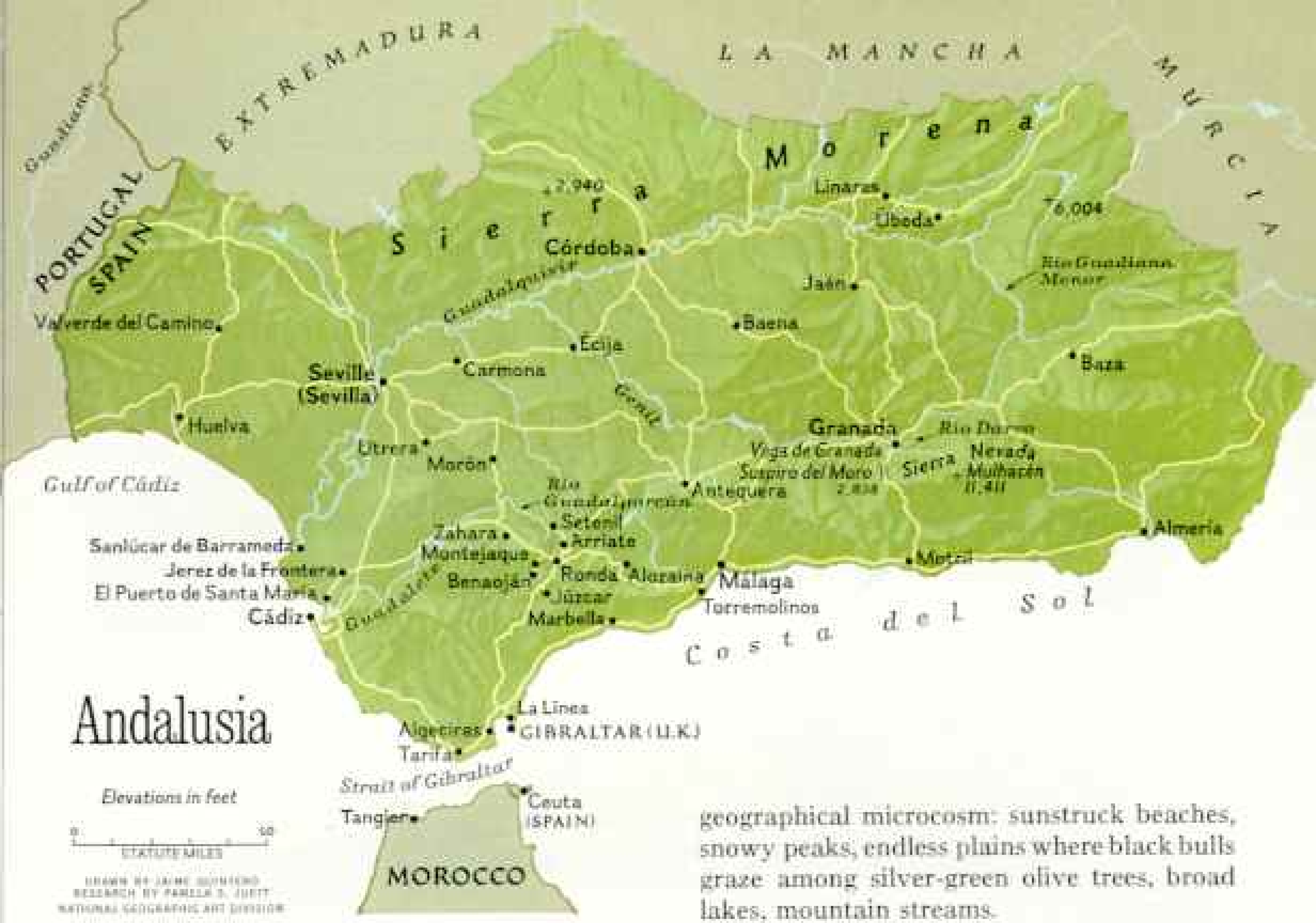
JAMES A. SUGAR (ABOVE)

Fantasy encased in reality: The Alhambra, palace fortress on Granada's heights (**left**), preserves the last glories of the Moors —Arab and Berber rulers who conquered Spain in A.D. 711 and were finally expelled in 1492. Intricate as fine lace, stuccowork filigrees an alcove (**above**) within the palace, where sultans and their harems once reposed amid perfumed air and plashing fountains.

TOR EIGELAND (ABOVE)

Monuments to tourism, new hotels and condominiums stand in ranks along Spain's Mediterranean shore at Torremolinos on the Costa del Sol. Bargain prices and subtropical weather make this 240-mile Coast of the Sun the fastest-growing vacation area in Europe. But with urbanization and with increasing pollution washing the beaches, many swimmers stick to hotelside pools.

Travelers began invading this region scarcely 15 years ago, when it was freckled mainly by tiny fishing villages. Early-rising fishermen (**left**) still beach their catch below the mist-veiled Rock of Gibraltar, ceded to Britain in 1713 and a Crown Colony since 1830. Today it lies isolated south of a frontier the Spanish closed to all traffic more than five years ago.


Andalusia
Elevations in feet
0
50
STATUTE MILES
DRAWN BY JAIME QUINTERO
RESEARCH BY PAMELA G. JUETT
NATIONAL GEOGRAPHIC ART DIVISION
EXTREMADURA
LA MANCHA
MURCIA
PORTUGAL
SPAIN
Guadiana
Sierra Morena
2,940
6,004
Linares
Úbeda
Córdoba
Guadalquivir
Jaén
Río Guadiana Menor
Valverde del Camino
Baena
Écija
Carmona
Seville (Sevilla)
Genil
Baza
Huelva
Granada
Río Darro
Vega de Granada
Suspiro del Moro
2,838
Sierra Nevada
Mulhacén 11,411
Utrera
Morón
Gulf of Cádiz
Río Guadalporcún
Antequera
Setenil
Zahara
Arriate
Almería
Sanlúcar de Barrameda
Montejaque
Jerez de la Frontera
Ronda
Alozaina
Málaga
Motril
Benaoján
El Puerto de Santa María
Guadalete
Júzcar
Torremolinos
Cádiz
Marbella
Costa del Sol
La Línea
Algeciras
GIBRALTAR (U.K.)
Tarifa
Strait of Gibraltar
Ceuta (SPAIN)
Tangier
MOROCCO

Atlantic Ocean
Paris
FRANCE
ITALY
SPAIN
PORTUGAL
Madrid
Rome
Lisbon
Mediterranean Sea
Andalusia
MOROCCO
ALGERIA
0
500
STATUTE MILES

"Where the desert and the garden strive for mastery," Washington Irving wrote of Andalusia, "and the very rock is . . . compelled to yield the fig, the orange, and the citron. . . ." Snow-shawled mountains and arid chasms flank the rich valley of the Guadalquivir River in this southern gateway to the Iberian Peninsula. Here the Phoenicians came to mine silver and lead, the ancient Greeks to trade and set up colonies, the Romans and the Moors to expand their empires.

geographical microcosm: sunstruck beaches, snowy peaks, endless plains where black bulls graze among silver-green olive trees, broad lakes, mountain streams.

And everywhere a memory of Araby. For in Andalusia—ruled for almost 800 years by Moors who came to love this fair land as much as Allah—words and place-names, foods and customs hark back to an age of turbaned knights and gazelle-eyed maidens.

O sublime wall, O towers crowned
With honor, with majesty, with grace!
O great river, great king of Andalusia!
. . . O flower of Spain!

—LUIS DE GONGORA

THE GUADALQUIVIR—in Arabic *al-wadi al-kabir*, or Great River—flows past Córdoba on its curving journey to the sea. Just below a bridge erected by the Romans, you can still see the crumbling mills built much later by the Arabs; their ruins clutch forlornly at the current that once ground flour for Western Europe's most brilliant city.

In the year A.D. 900, when Paris was a bastioned island, Madrid a Moorish fortress, and London a stockade fighting for its life against Viking raiders, Córdoba boasted a population of 500,000, miles of paved streets, and a library of 400,000 books.

As you walk through Córdoba's winding thoroughfares, you can read the city's history in stone. Here a Roman wall, there a Moorish gate, and before you a church commemorating the capture of this Moorish capital in 1236. You will discover too the remains of the most hauntingly beautiful mosque ever erected to the glory of Allah.

Although Córdoba has existed since Phoenician times, the city's glory came—and, to be truthful, departed—with the Arabs. In the year 711, Moslem armies smashed across the Strait of Gibraltar and, in a lightning campaign, seized control of most of the Iberian Peninsula. The banners of Islam even surged across the Pyrenees into France. The victory of Charles Martel (the Hammer) near Poitiers in 732 helped prevent the Moslem tide from engulfing Western Europe.

Spain's new overlords established their capital at Córdoba. In 757, as the Abbasid revolt swept the Arab world, they declared their independence of Damascus, then Islam's Vatican. For the next three centuries Córdoba—known as the "Athens of the West"—exercised a cultural domination of Europe. Arts and sciences flourished, more than 500 mosques raised their minarets above the city, and artisans plied varied crafts in more than 80,000 workshops. Their mastery of tanning echoes still in the word for the chestnut-colored leather called "cordovan."

The orchards and vineyards and fair skies of al-Andalus—as the Arabs called their new realm—soon seduced the descendants of the desert raiders who had won it. Women often went unveiled, and, despite the rigid Koranic proscription of alcohol, the Moslems of Andalus both admired wine and drank it copiously. An eighth-century prince sang in Córdoba:

"My nights I spend awake in drunken revels
And I never hear the morning muezzin. . . ."

Through 200 years the caliphs built and enlarged their great mosque—the second largest in Islam, after Mecca, and far lovelier than any other. Virtually every present-day visitor deplores the graceless 16th-century cathedral raised in the middle of the mosque by the Christians who captured it in 1236. "But," as a Córdoban friend told me wryly, "we should all be grateful for the cathedral. Without it, the mosque would have been torn down long ago. We Spaniards have never been renowned for religious toleration."

In Andalusia, music resounds everywhere—and almost always includes the plangent chords of a guitar. In Córdoba dwells the dean of Spanish guitar makers, 85-year-old Miguel Rodriguez (page 842). I visited his shop in the Calle Alfaros one morning and found him hard at work with his staff—one son and three grandsons.

"How did I get into this business?" Señor Rodriguez—stringy of body, alert of eye—echoed my question. "Well, when I was a boy I wanted a guitar but I had no money, so I was forced to make one. And that's what I've been doing for the past 70 years."

A Rodriguez guitar, costing between $700 and $800, is tailored to the hands of the player. "The wood," said Señor Rodriguez, "is of primary importance. You can predict, from the characteristics of the wood fiber, the sound of a finished instrument. For a classical guitar, we use Brazilian rosewood; for a flamenco guitar, cypress."

He showed me a guitar almost ready for the final coat of varnish—the formula for which is a closely guarded secret. "All our guitars have eight to ten varieties of wood," he explained, "and those with the decorative inlay have 12,000 separate pieces; we cut every one by hand. The stem is crucial, and must never warp. So we use very old Cuban cedar. We keep combing secondhand stores in search of 16th-century colonial furniture. Thank God, we find it often enough. But when the old cedar finally ends, so will the quality of guitars."

THREE MEN I MET in Córdoba exemplified how the Spanish Civil War—36 years after the fact—still casts its shadow across the nation. One of them, Angel, had lost an arm fighting for the victorious Nationalists. "We defeated the Reds. Remember that, hombre! Alone in Europe, Spain defeated Communism on the field of battle. And we intend to protect our victory."

Another, a Republican veteran, said: "In Spain, nobody forgives. Nobody forgets. We fought for liberty. We lost. Our punishment has no end."

A man whose father died for the Nationalists summed it up: "Our Civil War had no victor. Spain was the loser. Both sides, you see, fought for an ideal—for their particular vision of Spain. Foreigners intervened massively. The Germans and Italians for the Nationalists; the Russians for the Republic. We forgive none of them. They all used Spain as a vile little laboratory for World War II."

But nothing is immune to the mordant wit

Wall flowers bedecking a street in Benaoján exude the sweet and bitter scents of rose and geranium. A woman returns from a village well along the just-scrubbed mosaic-tiled passage, so narrow as to create shade even at midday. Constricted streets, iron-railed balconies, and studded doors all recall the time of the Moors.

A female partridge (**above**) also decorates a Benaoján street, living like a pet until the fall hunting season. The birds lure courting males from cover, a deception that adds a supplement to fish-heavy diets.

TOR EIGELAND

Sculpture for the ear takes shape under the sure hands of Miguel Rodriguez in his shop in Córdoba. The master guitar maker, working his craft for 70 of his 85 years, has produced some of the world's finest instruments. Now three generations of Rodriguezes turn out four or five guitars a month. Each will sell for as much as $800. The best, made from Brazilian rosewood, may include 12,000 hand-carved pieces.

Developed in Spain over a period of centuries, the guitar remains equally well suited for heart-racing flamenco rhythms or the mellower strains of classics performed by Andalusia's own Andrés Segovia.

permeating the Andalusian character. One morning I was strolling through the winding basil-scented streets behind the mosque with Angel. An elderly Gypsy woman in a bright, sleazy dress accosted us with outthrust hand. Angel—more, I thought, to impress me with his political purity than to rebuke the woman—barked, "Old one, are you without shame? Begging is forbidden by law."

"I know, *caballero,* I know," she cackled. "But I am in opposition to the government. Many are."

Give him alms, woman,
For life holds no greater sadness, none,
Than to be blind in Granada.

—FRANCISCO DE ICAZA

IF CÓRDOBA represents the brilliant noontide of the Arab Empire in Spain, then Granada glows as its golden evening. The setting dazzles the eye. The city rises at the edge of a high, verdant plain called the Vega, and nestles against the foothills of the Sierra Nevada. For 250 years after Córdoba's recapture by the ever-advancing Christians, Granada reigned as the premier capital of Islam—and perhaps of the world. Moslems everywhere believed that paradise lay in the cool blue sky above Granada. Visitors were rhapsodic in their praise. The city was "an enameled vase, sparkling with hyacinths and emeralds." The cornices of the houses "glittered like stars through the dark foliage of the orange groves." And the inhabitants? "Life was with them one long carnival...."

But doom hovered always beyond the horizon. The Kingdom of Granada, Islam's last enclave in Western Europe, stood with its back to the sea. By dint of gifted diplomacy and painful compromises—Granada early became the tributary of Castile—the Moslem kings kept their realm viable. But there is the bitter vignette of Muhammad ibn al-Ahmar in 1248 leading the Granadine army back from Seville where, as a loyal vassal, he had helped Ferdinand III wrest that great city from fellow Moslems. To the cries of the Granadinos, "Victor! Victor!" ibn al-Ahmar responded somberly, "God alone is the victor."

He and his successors emblazoned that motto on virtually every wall of the Alhambra, the magnificent citadel they erected on a hill dominating the city. And, as the 15th century waned, here in this golden palace suspended between the snows of the Sierra

Nevada and the orchards of the Vega, the last rulers of Granada took their pleasures as the final twilight crept across al-Andalus.

Distant fortresses fell, the clatter of Christian caissons echoed through the mountain passes, but in the Alhambra the soothing fountains splashed as they had for centuries. Those last sad summer days whiled themselves away amid pomegranates and chilled wine and songs of the chivalric exploits of long-departed Moorish knights.

In the spring of 1491 the host led by the Catholic monarchs Ferdinand and Isabella entered the Vega. The siege lasted six months. The last Moorish king, Abu Abdullah, defended the city irresolutely; this despite the harangues of his strong-willed mother, Ayesha. Finally he surrendered abjectly. On January 2, 1492, the Catholic monarchs and the army in a blaze of battle standards and glinting armor advanced across the Vega to the walls of Granada and took possession of the last Arab stronghold in Spain.

Thus ended a luminous epoch that had spanned almost eight centuries. While the rest of Europe blundered through the Dark Ages, the sciences, medicine, and philosophy had flourished in al-Andalus. Even our own language memorializes the debt Western civilization owes to the Moors; words such as algebra and alcohol, almanac and arsenal have come to us from the Arabs.

One monument remains: the Alhambra. In incomparable architecture, this fortress-palace freezes forever the high tide of Arab achievement.

"At the outset," Don Francisco Sánchez Roldán, supervisor of the Alhambra, told me, "you must recognize certain paradoxes. For example, while this royal residence unquestionably represents the most elegant example of Arab art extant, it was constructed of the poorest materials—clay bricks, wood, and plaster. Nor was it built to last, even though—thanks be to God—it has survived through 700 years. To Moslems, the dwelling of a ruler was a thing as transitory as his reign. Yet, through miracles of good luck and conservation—while other palaces from Syria to the shores of western Africa have disappeared—Granada still has the Alhambra."

Señor Sánchez, an energetic man with a swift smile, then guided me through his wondrous domain. "We have a staff of 200," he said, "including architects, sculptors, masons, and carpenters. They are all very skilled, and we can duplicate any object in the Alhambra should the need arise."

Rosemary and myrtle scented the air as we strolled in the gardens. "Do you notice," said Señor Sánchez, "that everywhere in the Alhambra you can hear the sound of water? An antidote for the desert. This was a barren hill until the Moors diverted water from the Río Darro some four miles east of the city and channeled it through here. The Alhambra is built on a slope, and the entire plumbing system—even the fountains—works on gravity. Although we've had to replace some pipes, it is still precisely as the Moors installed it." Passing between a pool and a clump of yellow roses, I recalled the Koran's description of paradise: "A garden flowing with streams."

Leaving Granada, I followed the road to the south. Just before it winds into the hills, it curves and reveals a final vista of the city, almost nine miles away. In that clear air, you can pick out the towers of the Alhambra crowning Granada like a tiara of antique gold (pages 834-5). This point in the road bears the name Suspiro del Moro, Sigh of the Moor, because chroniclers attest that, when he paused here on his journey into exile, Abu Abdullah sighed and wept for the city he had lost. They also record the scathing rebuke of his mother: "How dare you weep like a woman for what you would not defend like a man!"

Of you, Málaga, my heart forgets nothing,
Absence does not quench the flame of my love,
Where are your ramparts, O Málaga my beloved,
Your towers, rooftops, and sublime mirador?

—IBN SAID AL-MAGHRIBI

IF IBN SAID—who wrote these lines 700 years ago—could transcend the centuries, he would find strange new ramparts standing between his adored Málaga and the sea. Towering hotels and apartment buildings now front on the Mediterranean, and summer finds vacationists clogging the beaches and parks and alamedas of the city. For Málaga, which advertises itself as the capital of the Costa del Sol, has been engulfed by one of the greatest tourist booms in history.

Statistics cannot keep pace with the burgeoning of the Costa. At least 5,000,000 visitors arrive annually on Andalusia's Mediterranean coastline, and the true figure may well approach 10,000,000. A forest of cranes has pierced the sky east and west of Málaga as speculators have feverishly built more hotels

Tested for mettle, a heifer is challenged on the family ranch of bullfighter Alvarito Domecq. If the young cow turns and charges bravely, she may be worthy to breed bulls for the arena. Horses as well as bulls are Andalusia's pride. An equestrienne (**below**) comes to ride at the annual Seville Fair.

and more *urbanizaciones,* or subdivisions, to house the crush of tourists and expatriates seeking to live cheaply in the sun. Between 1970 and 1972, the number of hotel beds on the Costa increased by 112,226; in other accommodations, by 648,383.

Each year the once lonely and beautiful Costa sinks a little deeper into a kind of jet-set version of Coney Island. In Costa resorts, you can munch Wimpy Pure Beef Hamburgers; buy bread at the Viking Scandinavian Bakery or fruit juice at Orange Julius. Britons find surcease at the English Tea House, Germans at the Zum Blauen Bock. Dutchmen relax in the Hof Van Holland; Finns in the Casa Finlandia. And should some miracle lead a Russian to the Costa del Sol—everyone's home-away-from-home—he would find the СЛАВЯНСКИЙ БАР, the Slavic Bar.

Torremolinos, eight miles southwest of Málaga, incorporates all the horrors of tourism run amuck. Eighty-two high-rise hostelries all but blot the beach, sea, and sky from view (pages 836-7); an estimated 300 bars slake touristic thirst; 200 nightclubs provide nocturnal diversion; so many restaurants line the Calle Cauce that Spaniards call it the "Street of Hunger." In a kind of ultimate irony, the raw sewage pumped tirelessly into

the sea by the city of Málaga befouls Torremolinos's chief attraction—the beach.

Virgin in crinoline . . .
In your ship of lights
You go along the high tide
Of the city.

—FEDERICO GARCÍA LORCA

THE CLIMAX of the Andalusian year, both liturgical and social, comes with *Semana Santa,* Holy Week. These eight days, beginning with Palm Sunday and ending with Easter, commemorate the central drama of Christianity. For months in advance, sewing machines hum from Seville to Almeria, turning out suits for men, frocks for women. During Holy Week everyone appears in his finest, and even the poorest households produce a few banquets.

Semana Santa possesses a lexicon all its own. Virtually every parish in Andalusia has its *cofradía,* or brotherhood, that exists primarily to march on a night of Holy Week beside flower-decked platforms, called *pasos,* bearing images of Christ and the Virgin. The marchers, or *nazarenos,* wear sinister Ku Klux Klan-type costumes that descend from the *sacos benditos* that clothed medieval penitents (next page).

Pasos weigh as much as eight tons, and brawny members of the cofradías called *costaleros*—literally, "sack men"—not only carry them but do so to the precise rhythm of the band music, negotiating corners and curves with controlled elegance.

For most of my life I shared the stern Anglo-Saxon disapproval of decking statues with silk and jewels while people struggled for their daily bread. But after Semana Santa in Andalusia, I am no longer sure. For this short, shining season, God's poor live amid blossoms and brocade, gold and lace. For an octave of days they lose themselves in a vision of glory and redemption. Against that, what is bread?

Seville's Holy Week ranks as the most revered in Spain. Processions jam the streets daily. From balconies, Gypsies sing the flamenco songs of religious praise known as *saetas,* or arrows. Still, most Spaniards regard Holy Week in Seville as grossly commercialized. For true devotion, they tell you, go to the isolated villages in the mountains—the villages unknown to tourism and television.

So I went to Ronda, a whitewashed Arabic town of 33,000 high in the cordillera between Seville and Málaga. And the counsel proved correct. In Ronda the Wednesday night of Holy Week brings a unique "Procession of

MICHAEL KUH

In eerie solemnity, men robed as medieval penitents file through Seville during Holy Week. Called *nazarenos*, they escort floats bearing statues of Christ and the Virgin Mary.

Silence." To the stark beat of a single muffled drum, nazarenos shuffle through the still streets. Their feet are bare; heavy chains clamped to their ankles scrape eerily on the cobbles. The only light in all the town comes from the flickering candles they carry. All else is darkness and silence.

But the memory of Ronda that I will keep came 24 hours later.

Midnight in the Street of Saint Cecilia . . . the hour of candles and cornets separating Holy Thursday from Good Friday. From the Church of Padre Jesús, the parish of the Gypsies, 60 sturdy costaleros emerge with the paso of the grieving Virgin on their shoulders. The crowd, jamming the sidewalk and overflowing into the narrow street, roars its approval of the Virgin's gorgeous mantle and the flowers and candles that embank her.

With two bands setting the stately rhythm, taper-bearing nazarenos in purple robes lead the procession up the steep, cobbled street. At its top a pretty girl in a black veil peers from behind a barred window. Scents of almonds and carnations and burning beeswax mingle in the night air as the nazarenos mount the hill. Behind them, in a blaze of lilies and lights, comes the image of the mourning Virgin whose Son died to redeem Ronda and the world.

The girl, a novice, watches the approaching statue from her still place behind the iron bars. The black of her veil accentuates her olive Andalusian face. Drums crash their slow cadence and cornets blare as the paso reaches the corner beneath the girl's window. There the music stops, and the costaleros lower the massive paso. In the sudden, complete stillness, the girl with the black veil begins to sing. Her hands clutch the bars of her window, and her voice rises and ululates in a saeta, an arrow of harsh-edged, infinitely sweet melody aimed at heaven:

"A bright star watches over thee,
Leaving thy chapel.
All of Ronda honors thee . . .
The Mother of forgiveness."

The voice dies in an ache of sorrow. For a moment all is silence. Then the drums roll, the cornets blare anew, and the Virgin sways past the barred window. The girl with the black veil watches as the paso sways around the corner. Then she slowly turns away and the interior darkness absorbs her. She is a cloistered nun; men will not see her face again.

The South is a wasteland
Which weeps as it sings.
—LUIS CERNUDA

IN THE CORDILLERA surrounding Ronda, the rough ridges and peaks seem to claw at the sky. The villages are white, clusters of confetti strewn carelessly across crests and uplands; villages that still preserve names conferred by their long-ago Moorish founders—Alozaina, Benaoján, Júzcar. Olive trees march in serried ranks up the slopes, millet ripens on the plateaus, distant church bells clang sweetly on the thin air. Ostensibly, the agricultural hamlets of Andalusia remain impervious to change.

But only ostensibly. As I journeyed through the mountains, I perceived something odd about these towns, something I seemed to feel but could not quite identify. Then one day, while driving through a village called Montejaque, it came to me with sudden clarity. In all the hamlets, I'd seen boys and old men—but almost never a male in his prime.

I consulted a friend in Ronda. What, I asked, had happened to the men?

"They're working abroad," he explained. "Andalusia is arid and mountainous. The fields are too steep for tractors, and we can't compete with mechanized farms elsewhere. So the men of these villages work in the north—in Germany and France and Switzerland. How else could they support their families?"

I sought out the mayor of Montejaque, Don Zunifredo García Vazquez. He is also the principal of the town's elementary school, and I found him presiding over a study hall. Don Zunifredo is an engaging man of great candor. "Yes," he told me, "we have a sociological crisis. Other towns in Andalusia—and in all southern Europe for that matter—share it. We are a cheap labor market for the industrialized nations of the north."

Montejaque is old and Moorish. Plumbing does not exist. Women, all wearing dark shawls, walk frequently to the town's two fountains to fetch water they carry in jugs on their heads. When they saw me, a stranger, they drew the shawls across their faces exactly as Arab women wear their veils.

"This village," said Don Zunifredo, "dates from at least 1,250 years ago, the time of the earliest Arab invaders." Then, as so often happens in Spain, the gaping 20th-century wound opened for a moment: "All of our chronicles were burned during the Civil War. The details of our past are lost forever."

Of Montejaque's 2,300 inhabitants, the mayor informed me, 400 work abroad—the vast majority in Germany. "We call them 'Germans.' Each sends about $150 a month to his family, and once a year—usually in August—they come home for a vacation.

"The money they send brings a certain prosperity, but the problems are enormous. Some men eventually melt away, absorbed in new lives abroad. With no father in the house, mothers can't control their children. And the boys of Montejaque think only of working in Germany. Their fathers arrive each August with money and automobiles. So the boys have fantasies of getting rich. Not one of them would be content to stay here."

To learn something of life in a village without fathers, I spent a day in Montejaque. It began at dawn when I joined José Naranjo López, Montejaque's milkman. Himself a former German, José—or, as everyone calls him, Pepe—goes each morning to fetch milk in the high mountains. Followed by his gray burro, we threaded fields of golden wheat and vividly green chick-peas. Poppies blazed like vigil lamps in the dim, oblique light of sunrise.

High in a mountain pass Pepe met his supplier, taciturn Rafael Arcón, who lives on the heights with his herds. Fresh, creamy milk—20 gallons of it—splashed into the tin cans strapped to the burro's back.

Nine o'clock found us in Pepe's house in the village breakfasting on huge glasses of *café con leche*—coffee with milk—and thick slices of *torta de chicharrones,* a round loaf of bread laced with lard and morsels of pork. "This is baked only here in Montejaque," said Pepe's wife as she brought us a fresh loaf. "Ah, how the Germans miss it! They yearn for it in all their letters."

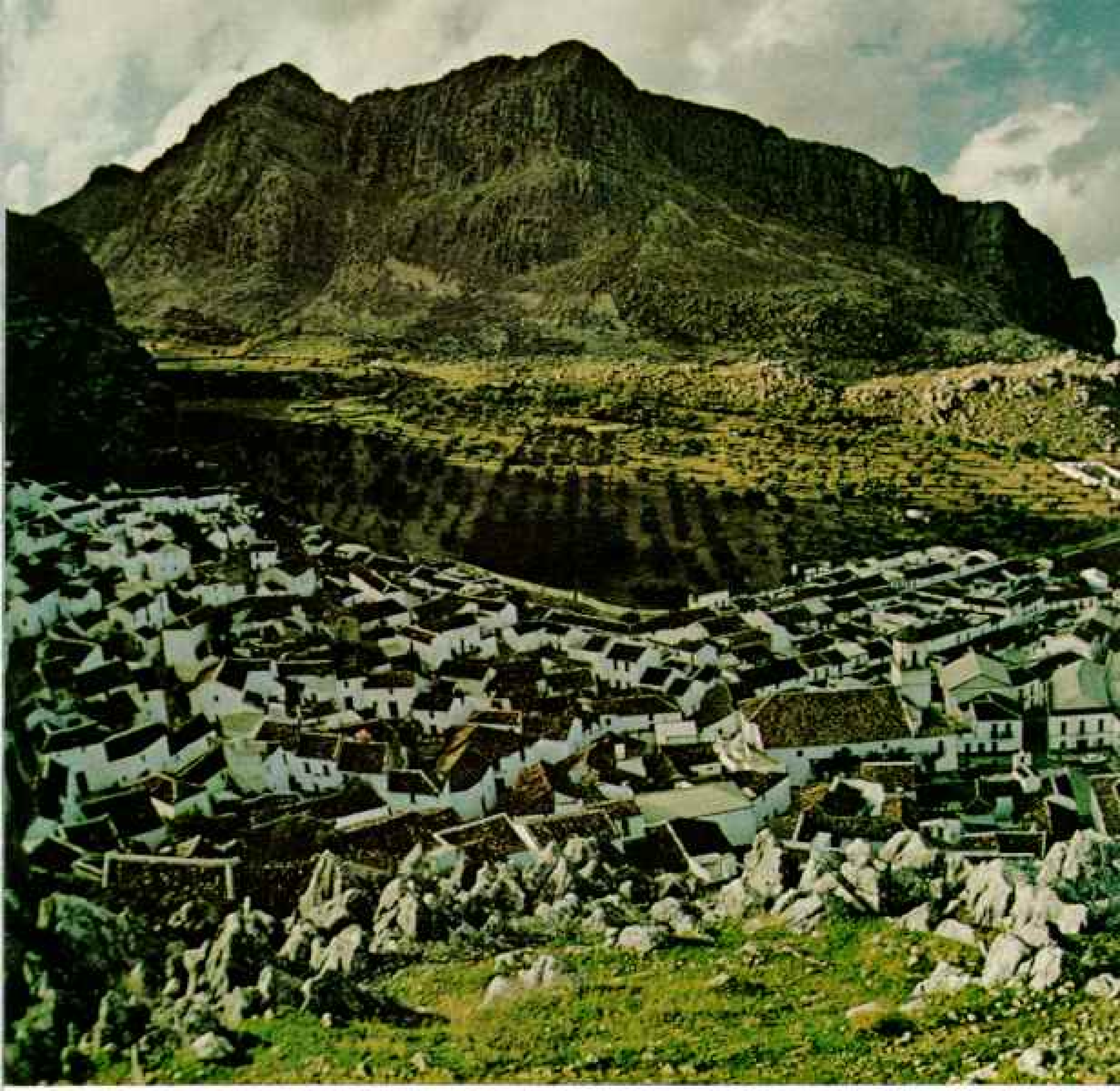
Women drifted into Pepe's house to buy milk. One, with an infant son, joined us at the table. Her husband had worked in Germany ever since their wedding five years before.

There was much joking and much laughter. "The women of Montejaque!" exclaimed Pepe's wife. "At the end of August they kick the husbands out. 'Get back to Germany,' they say, 'so you can send me more money.'"

"Yes," said the young mother. "We are all alike. We think only of the fine houses and mules and goats we will buy."

Another ripple of laughter. As it died, the young mother's eyes crinkled wistfully, sadly.

Pepe, suddenly grave, turned to me. "Here



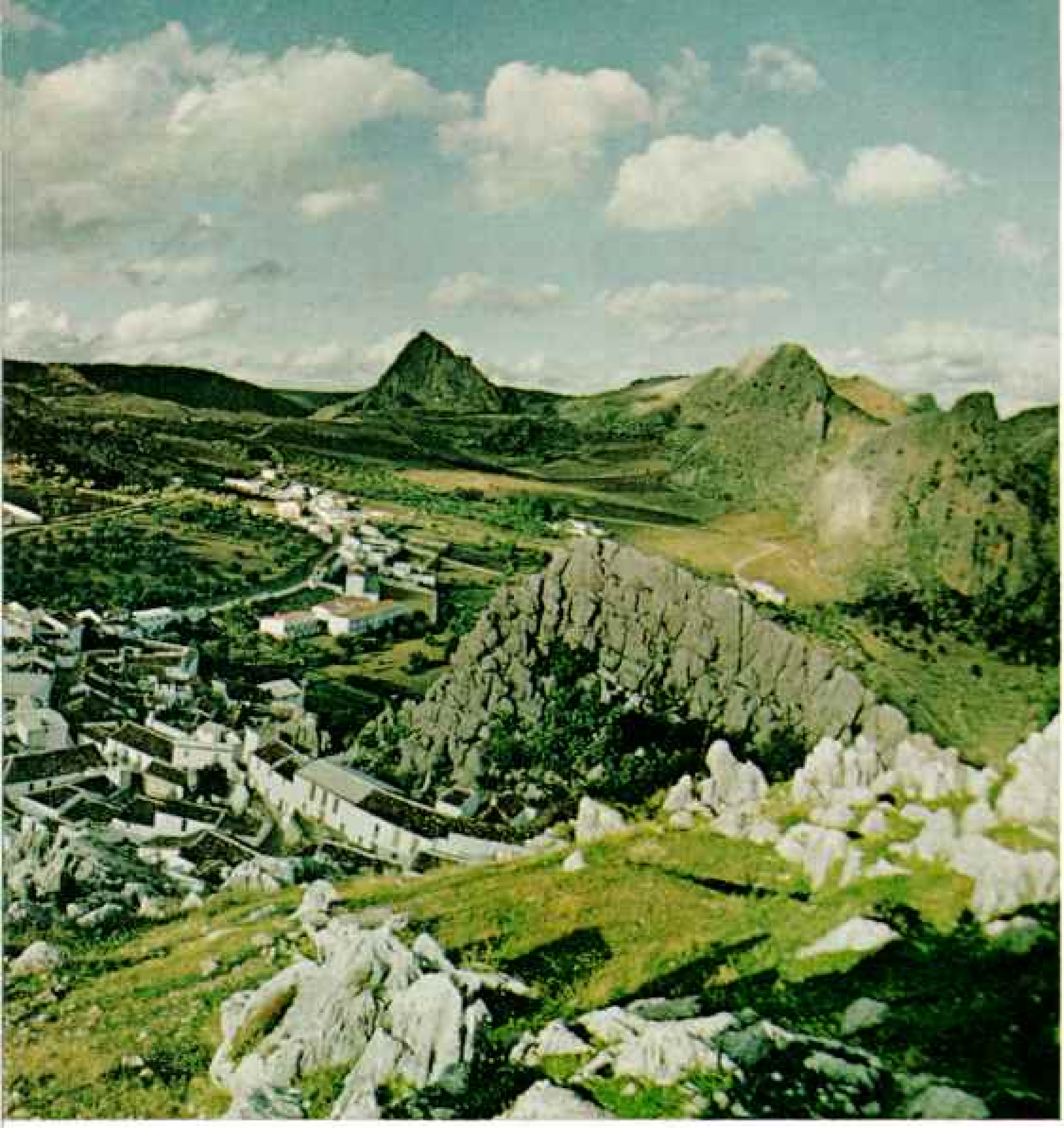
Protective embrace of the Sierra de Ronda enfolds Montejaque and its few arable acres. Most of the village's young men are away for much of the year, working in

you see no wife, but a widow. Understand this: Montejaque is a village of widows."

Seville, you are no city, but a world;
The scattered marvels of other capitals
Have come together in you,
O part of Spain so much greater than the whole.
—FERNANDO DE HERRERA

SEVILLE IS FOR STROLLING. Like Córdoba, it nestles beside the Guadalquivir; cafés and restaurants and flowering trees overlook the quays of the great river. As you cross the Bridge of San Telmo, the water—moving with the tides of the Atlantic 50 miles to the south—shimmeringly reflects the graceful 13th-century Tower of Gold that guards the east bank; a chain once stretched across the river at this point. Moorish officials quartered in the tower levied fees and duties on passing vessels.

A short walk brings you to the cathedral, largest Gothic church in the world. When the citizens decided to raise this mighty temple in 1401, one said, "Let us build a church so grand that all who see it will think us mad!"



the factories of Germany, Switzerland, and France. Foreign wages account for some 38 billion pesetas (nearly 600 million U.S. dollars) of Spain's annual income.

Mad? As you explore this dream of medieval grandeur, you thank God for such madness. In the gloom glow paintings by Murillo and Zurbarán; everywhere you see marble and alabaster carved with wondrous skill; stained-glass windows splash the dim interior with scarlet and purple and gold.

Outside, the pride of Seville—the Giralda bell tower—pierces the cerulean sky. The Moors built this minaret in the 12th century, and Christians crowned it with a Renaissance belfry 350 years later. Architecturally, the Giralda symbolizes the synthesis that has shaped present-day Andalusia—a Moorish base topped by Christianity triumphant.

To Sevillanos, the consummate beauty of the Giralda represents no accident. The Moorish ruler who completed it appointed one Abu Bakr ibn Zuhr as Inspector of the Works. Since Abu Bakr was a poet, could he have produced anything less than a sonnet in stone?

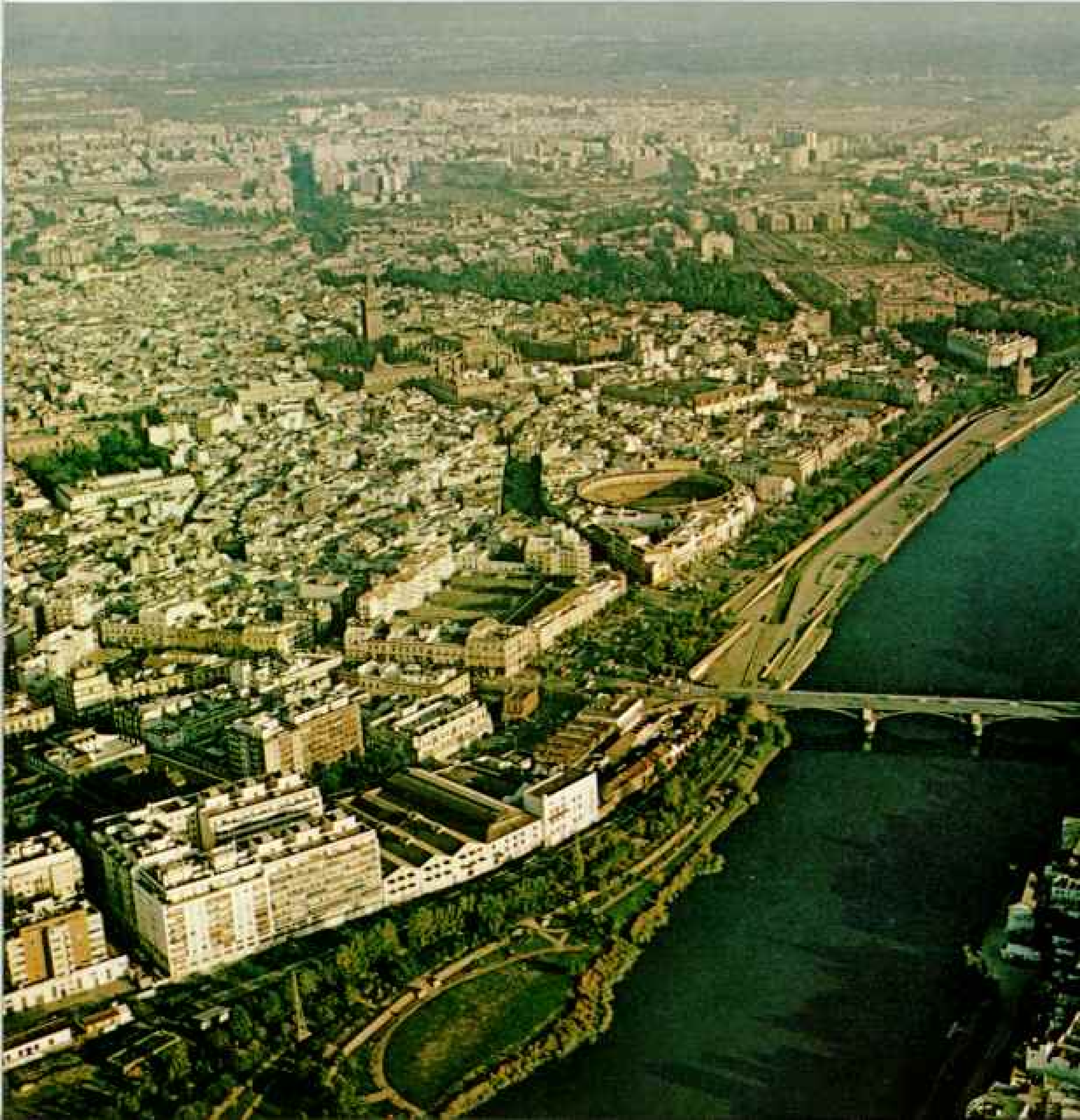
Behind the cathedral lies the Barrio de Santa Cruz, Seville's medieval ghetto. Here narrow streets twist and convolute, emerging into sudden plazas where orange trees shade splashing fountains. Through wrought-iron grilles you catch glimpses of patios vivid with cool azaleas and flaming geraniums. Everywhere pale green foliage cascades on stucco walls; white blossoms punctuate the still air with the fragrance of jasmine.

MOST SEVILLANOS, however, find the soul of the city beside the Guadalquivir in an arena of golden sand called La Maestranza (below, left center). It is a *plaza de toros*, a bullring, and—with its graceful arches and tiled roof and the Giralda soaring behind it—aficionados of the *corrida* count it the loveliest in the world.

Perhaps because of Andalusia's Moorish heritage, representational art has never flourished here. True, Picasso was born in Málaga; but he hastened north at an early age. Andalusian art finds expression in living, transitory form: The flashing chords of a guitar; the swirling arabesques of a flamenco dancer; and, most profoundly, in the fluid sculpture of man, cape, and bull in the arena.

Most foreigners regard the bullfight as an abomination—an animal is tortured by a picador, tormented by a torero, and then slain. To Spaniards, it represents an epic confrontation: A man armed only with a cape and a slender sword challenges one of the most fearsome of creatures, dominates it, and kills it.

For their fame and their premium wage, the *matadores de toros*—killers of bulls—pay



a brutal price: Some die in action; virtually all suffer grave wounds—50 bulls had gored the matador José González before one finally killed him; the bravest live with fear as a constant companion.

Once an American girl met the greatest matador of our time, Manolete, as he donned his *traje de luces*—suit of lights—for a corrida. "Excuse me, señorita, if I don't talk much," he said with a shy smile, "but I am very scared." Manolete rose from the gutters of Córdoba to earn $4,000,000. But in 1947, in Linares, a bull gored him in the groin and killed him. Manolete was 30.

The fear is always there. Seville's great Juan Belmonte once observed, "If contracts were signed one hour before the corrida, there would be no bullfights."

In Seville lives a unique matador de toros, one who pursued the classical path to his position: He received the *alternativa*—a kind of ordination as a matador—in the bullring of Seville. He is the only American ever to have done so. His name is John Fulton, and he was born in Philadelphia.

John is an artist as well as a torero. I found him in his studio near the Barrio de Santa Cruz. "What got me into all this," he told me, "was the film *Blood and Sand*. I saw it as a kid in Philadelphia—over and over—and that obsessed me with the bulls.

"Later, when I was drafted, the army sent

CARL PURCELL (ABOVE)

Old link with the New World, Seville spreads along the Guadalquivir River—staging area for voyages of discovery and colonization. The Andalusian capital gave to art two of its greatest painters, Murillo and Velázquez; to opera the characters of Carmen and Figaro; and to flamenco dancing (**above**) a style known as *sevillanas*.

me to Texas. Every weekend I crossed into Mexico to see the corridas. Eventually I made the right friends and got to work a few bulls on the breeding ranches. Then I talked my way into corridas in the border towns.

"Spain, of course, is the major league. And here a foreigner—particularly an American—is regarded as a kind of freak. You must work very hard to overcome the inherent belief that only an Andaluz has *gracia*."

Another torero, Diego O'Bolger, had once defined gracia for me—"when divinity touches the individual, who then projects it to the spectators."

In any case, John Fulton has overcome all prejudice. At La Maestranza he fought a 6-year-old, 1,320-pound Miura, performing so nobly that aficionados carried him around the arena on their shoulders. After a triumph in the plaza of El Puerto de Santa María, on the coast below Seville, he rode the entire city on a tidal wave of admiring enthusiasts.

ON A SILVERY SUMMER EVENING, I accompanied John to a corrida at La Maestranza. The toreros were *novilleros*—young men who had not yet received the alternativa—and the bulls they would fight were juveniles of 3 years rather than the massive 5-year-olds faced by full matadors.

As the first bull of the evening burst into the ring like a black thunderbolt, John began a professional commentary: "At the beginning you can learn a lot about a bull. You wave a cape across the arena; if he charges, he has good distance vision. If his charge brings him smashing into the wooden *barrera*—or barrier—this shows bravery. Once he's hit the wall, the bull will be wary of it; you can work him near the barrera knowing that he'll charge on the side *away* from the wood."

At the outset, neither bulls nor toreros displayed much "caste," and the spectators began to hoot. "The crowd influences a corrida," John said. "If it's hostile, you grow very tight and make mistakes; if it's with you, anything seems possible." The third bull, which charged with deliberation rather than rage, John pronounced *mucho sentido*, a fast learner.

"How would you handle him?" I asked.

"Well, first, I'd wish that I were somewhere far away. With one like this, you can only rivet him to the *muleta*—the scarlet cloth. You catch his outside eye and pass him as attentively as you can." The novillero fighting the *sentido* bull displayed much bravery but little talent. At one point, John shook his head. "Look," he said, "the torero isn't moving the cloth. The bull charges movement,

Fugue of death: Bull and matador weave a counterpoint on the sands of Seville's bullring, a drama captured in a double exposure. Andalusia has produced great bulls and bullfighters, among them three of the world's most famous—Belmonte, Joselito, and Manolete. More than 100 ranches breed animals renowned for strength and bravery.

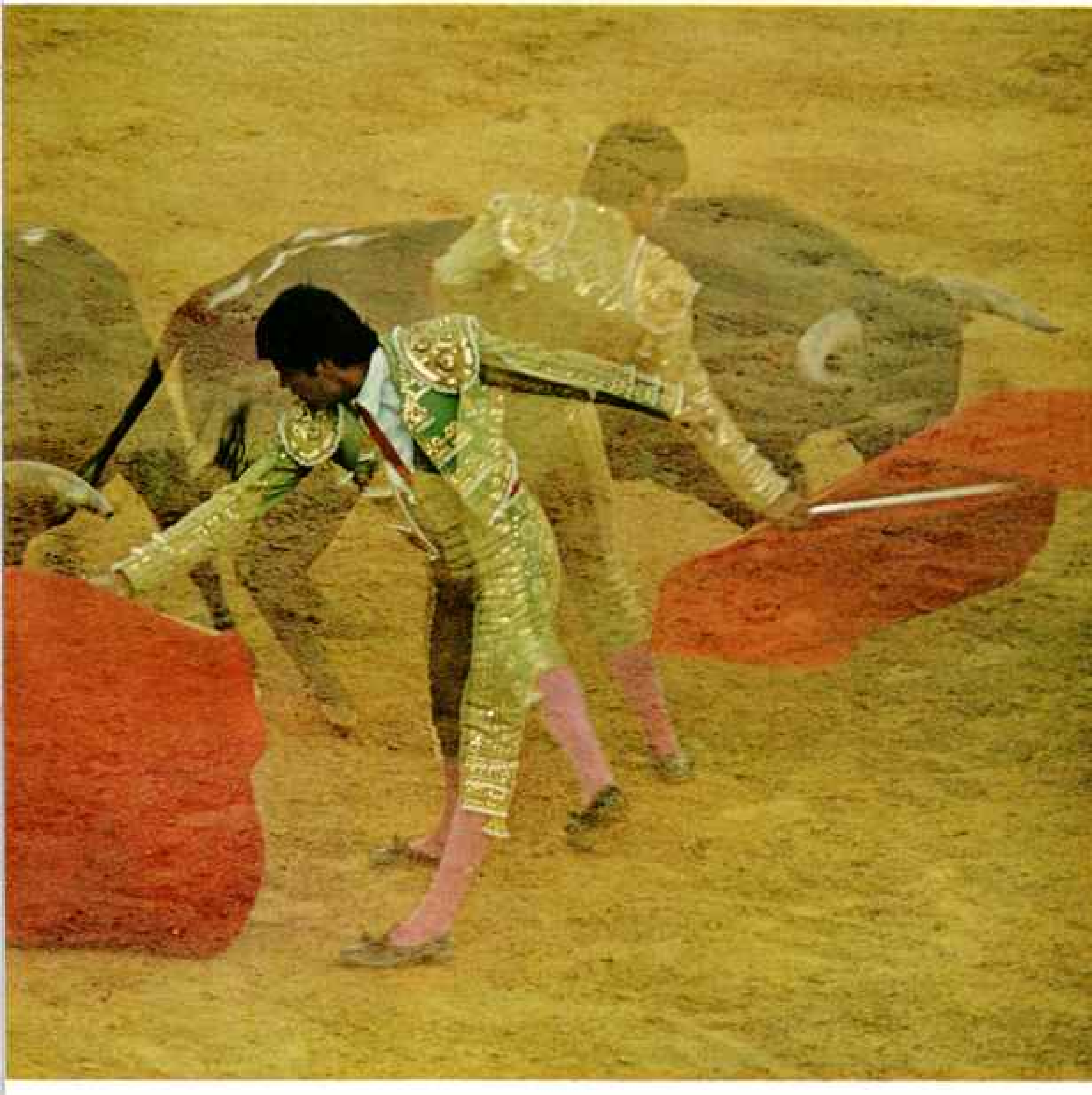
but there's none. This is very dangerous."

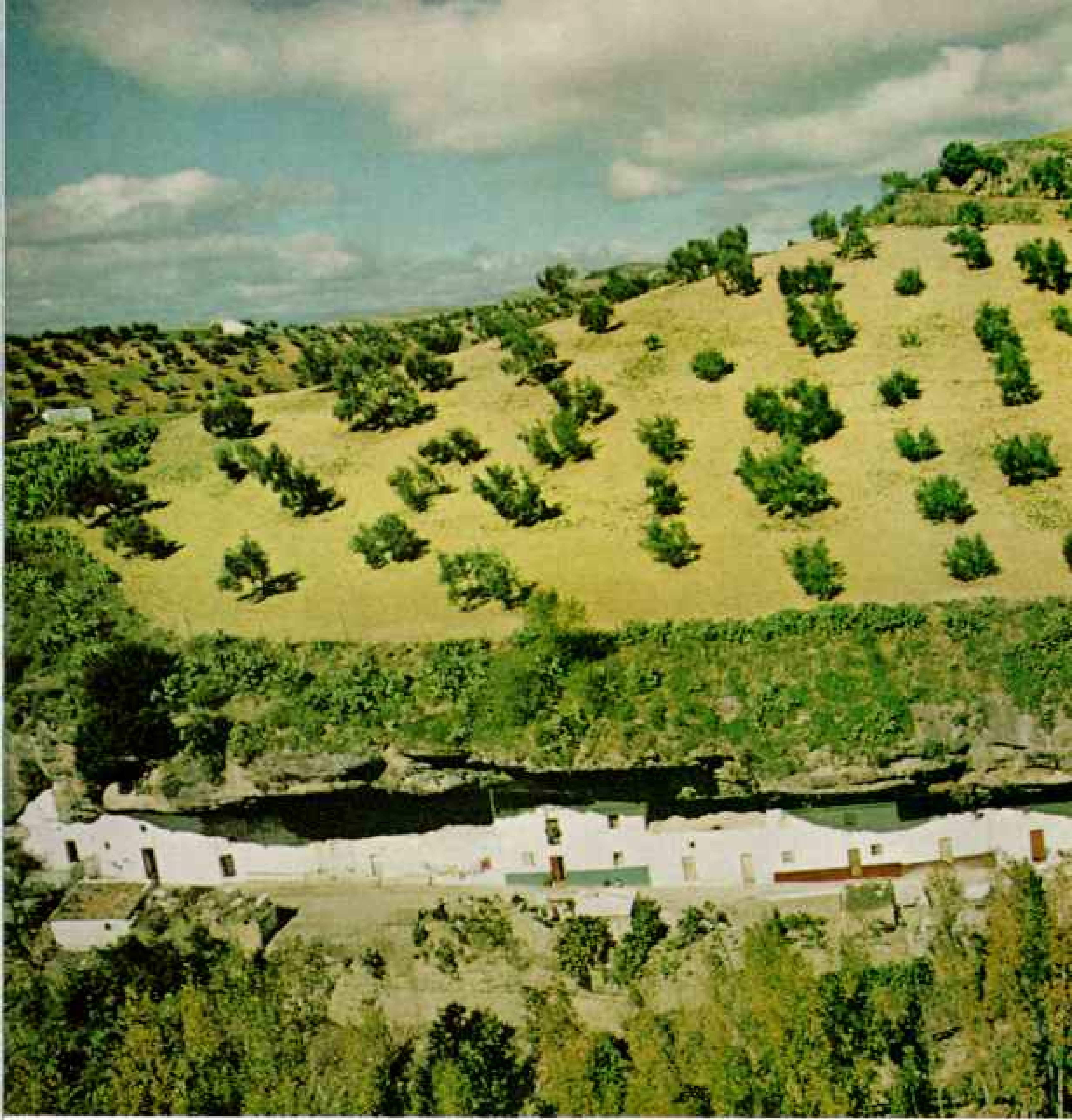
The novillero—frightened perhaps—stood like a statue; the muleta dangled immobile. Suddenly the bull charged, caught the man dead center, tossed him up and over. Shrieks shredded the collective gasp of the crowd.

Swiftly the young torero scrambled to his feet. Mercifully, the bull had slammed him with his forehead rather than the lethal horns.

Striking a pose of stylized arrogance, the man strode toward the animal. "The bull just learned something," John murmured. "He hit something that was solid. He will remember." At that precise moment, the bull bolted forward. This time the horn caught the novillero in the thigh; and this time he did not get up. When his assistants carried him from the ring, a crimson stain—like a rosebud opening into a poppy into a camellia into a sunrise—spread across his suit of lights.

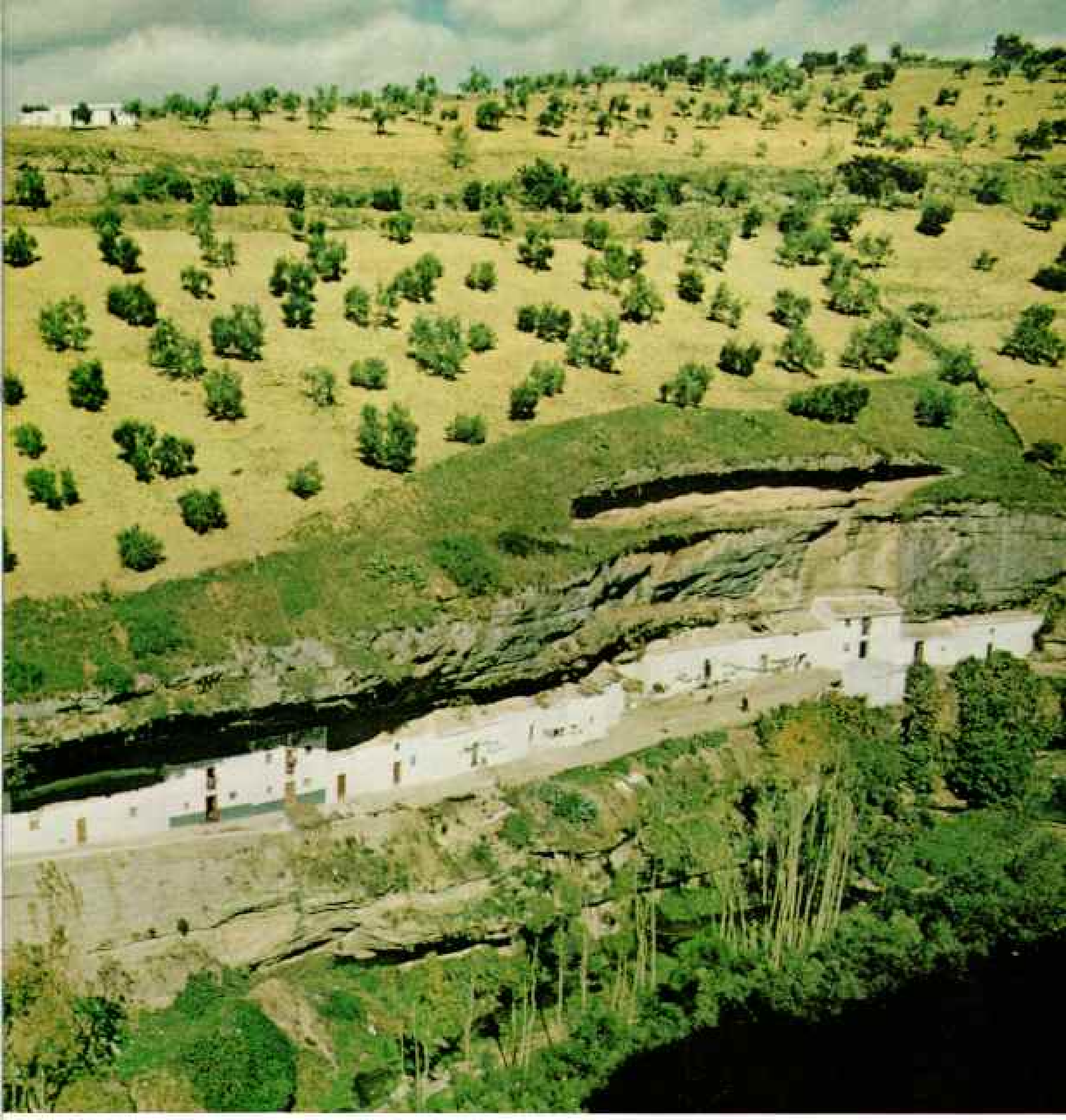
Most brilliant and tragic of spectacles, the corrida possesses a "clear and icy geometry of death." Always for the bull; sometimes for the man. In the golden arena, amid the swirling capes and the sound of trumpets, the only certainty is doom.





Olive trees stud the rooftops of cave homes in Setenil, an agricultural village built into steep cliffs above the Guadalporcún River. Andalusia's rock-cut homes leave flat land free for crops. Last year Andalusia produced 1.6 million tons of olives, two-thirds of Spain's harvest.

Like caterpillars shucking skins, plastic covers roll back to let the sun shine on grapes destined for sherry in the Pedro Domecq winery at Jerez. After the grapes are dried, pressed, and fermented, the wine undergoes five to eleven stages of blending over several years. Only wines produced in a small triangle between Jerez and the coast rightfully bear the name Spanish sherry.



Dancers with no hips
Sob in the mirrors. . . .

—FEDERICO GARCÍA LORCA

BARELY five feet tall, old, balding, fat, wearing a hearing aid, and with one leg several inches shorter than the other, he is nobody's idea of a flamenco dancer. Yet, when 62-year-old *Enrique el Cojo*—Henry the Cripple—performs, the hall is filled and the crowd hushed. For he is the greatest in Spain.

I saw him dance a series of *sevillanas* with lithe, lovely Merche Esmeralda, a recent winner of Spain's national dance contest. Sevillanas are the lightest, airiest, most superficial of flamenco rhythms; but artists of stature bring profundity to anything they essay. Enrique, a column of serenity and strength, danced with stately gaiety while the girl swirled about him like quicksilver.

Every major dancer in present-day Spain has been Enrique's pupil. He now instructs 30 students in his studio in Seville.

I had searched there for him, but his neighbors—and in Andalusia everyone knows everyone else's business—had informed me that he was on the Costa del Sol. There, in a cabaret, I finally found him.

After his last performance of the evening, Enrique slumped wearily at a table, his broad, seraphic face glazed with sweat.

I asked him about his students.

"They come from everywhere," he told me with a touch of pride. "From Spain, of course, but also from Japan, South Africa, America. To teach them technique is a joy. But teaching them this"—he patted his heart—"is very difficult. Flamenco requires gracia, and that is uniquely Andaluz."

As long as he could remember, El Cojo told me, he had wanted to dance; but, at the age of 7, a tubercular tumor left him crippled. "It was a slow recovery," he said. "One that extended through many years. I practiced dancing while sitting up in bed. After all, in the dance, feet are only instruments of rhythm; you express purity and grace with your hands and your upper body."

Doctors warned him that even the attempt to dance would probably cost his life. "My parents begged me not to try. But dancing obsessed me. And dying? Death was better than not being able to dance. So I practiced, I taught myself, I devised compensations for my short leg, and finally, through sheer tenacity, I succeeded."

The manager of the cabaret approached our table. "Maestro," he addressed Enrique, "all of us have been deeply moved, and the audience will not leave. Could you dance one more time, no matter how briefly?"

Enrique's weariness evaporated. "But of course," he said, pulling himself erect.

On the stage, the lights blazed anew and guitars began to strum. I shook the master's hand in farewell; he limped out into the electric brilliance to thunderous applause. And I remembered how, in Seville, his mailbox did not bear his family name, Jiménez. In orange letters it boldly proclaimed: Enrique el Cojo.

From tears of remembrance,
I know no surcease,
What madness to leave you,
Fair al-Andalus!

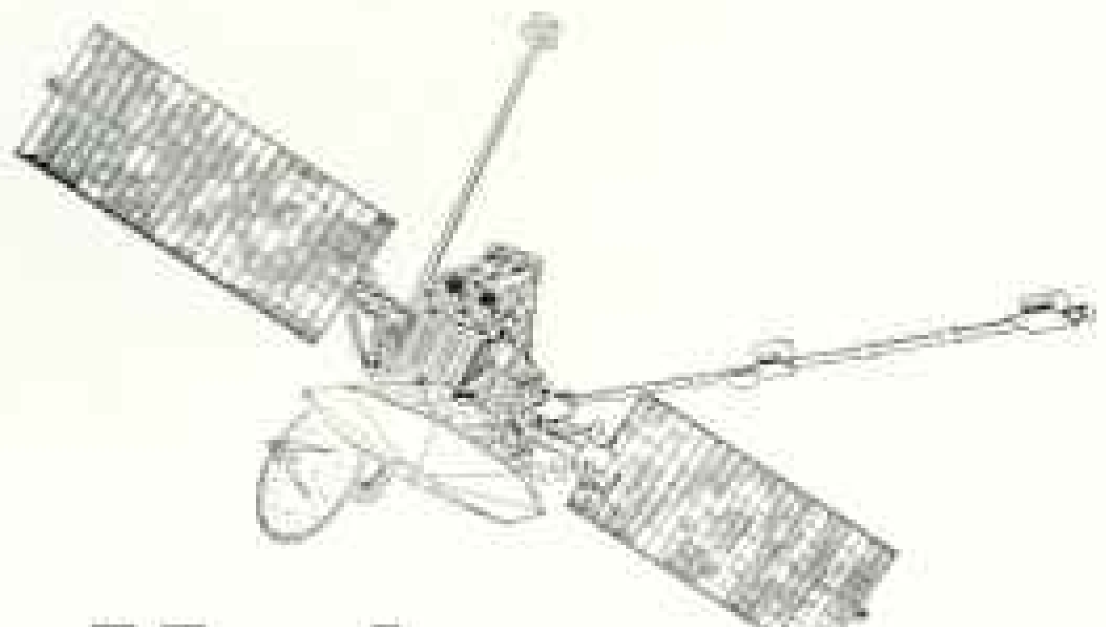
—IBN SAID AL-MAGHRIBI

WHEN I DROVE DOWN for the last time from the Sierra Morena, I passed through scenes I had come to know and excessively to love. Timeless as clouds, flocks of sheep grazed among olive groves; stark, white villages as stylized as cubist paintings clung to the hills. On the summits Moorish castles loomed and disappeared like dreams remembered.

At the foot of the mountains stretched the endless orange orchards; amid foliage the color of old jade, ripe fruit flickered like random embers. Along the coast the Mediterranean scalloped and scoured the sands as it has for eons; on the beaches fishermen grilled sardines over wood fires; glasses of sherry gleamed like pale gold on the tables of the outdoor cafés.

On that last day I thought affectionately of the 12th-century Andaluz poet Ibn Safar al-Marini. Contemplating the heavenly joys promised to the faithful, he concluded that on the whole he preferred Andalusia. For, as he pointed out reasonably enough, "here there are delights that do not exist in the Eternal Paradise." □

Savoring leisure like a mellow wine, men of Zahara play dominoes. Many Andalusians earn only enough for the day, finding their key to happiness in relaxation.



Mariner Unveils Venus and Mercury

By KENNETH F. WEAVER

ASSISTANT EDITOR

AN ENDLESS MONOLOGUE of high-speed telemetry chattered into the control room at the Jet Propulsion Laboratory in Pasadena, California. Quivering pens traced their squiggly messages on long rolls of paper. And on TV screens in front of us flashed images in shades of gray.

We were seeing what no man before had ever been privileged to see—the bleak, pockmarked face of the planet Mercury. Nearly a hundred million miles away, a little louvered pillbox with spidery arms, solar panels, and a parasol sunshade was at that moment aiming cameras and instruments at the planet's surface. The powerful cameras were recording objects only a few hundreds of yards across. The dull, fuzzy disk of Mercury that astronomers see under the most ideal conditions was resolving itself into spectacularly clear scenes.

As this terra incognita unrolled before us, we saw a moonlike panorama of craters in profusion, ridges, and vast lava plains filling huge basins—evidence of cataclysmic bombardment and massive volcanic outpourings.

The story of the little spacecraft, known as Mariner 10, was itself enough for excitement. After a 21-week voyage, despite a succession of problems, it had come to its target with an error of only 104 miles in a flight path of 250 million miles. Assaulted on its sunward side by heat five times as intense as that felt by earth, yet freezing in its own shadow, it was performing without flaw.

But the real excitement lay in Mariner's message, for the unexpected knowledge it was sending back to earth would affect man's understanding of the solar system, its origin, and its evolution.

Voyages to Distant Worlds

Mariner 10's visit to Mercury was but one of a fast-moving series of NASA excursions to the planets. Only 18 months before, Mariner 9 had completed photographing the varied face of Mars, showing in rich detail gigantic volcanoes, craters, and a canyon system so vast it could span North America.

Then Pioneer 10 had raced through the deadly radiation belts of Jupiter, photographing the huge planet with its red spot and swirling storms.* And Mariner 10 itself had swept by Venus, recording for the first time details of the dense clouds that make the planet such a brilliant object in our night sky.

Venus and Mercury, targets of Mariner 10, have long aroused curiosity. Innermost of the planets, lying between earth and the sun, both have been special enigmas. Venus is shrouded in clouds so thick that we can never see the surface. Little Mercury, not much larger than the moon, flits about the sun like a moth

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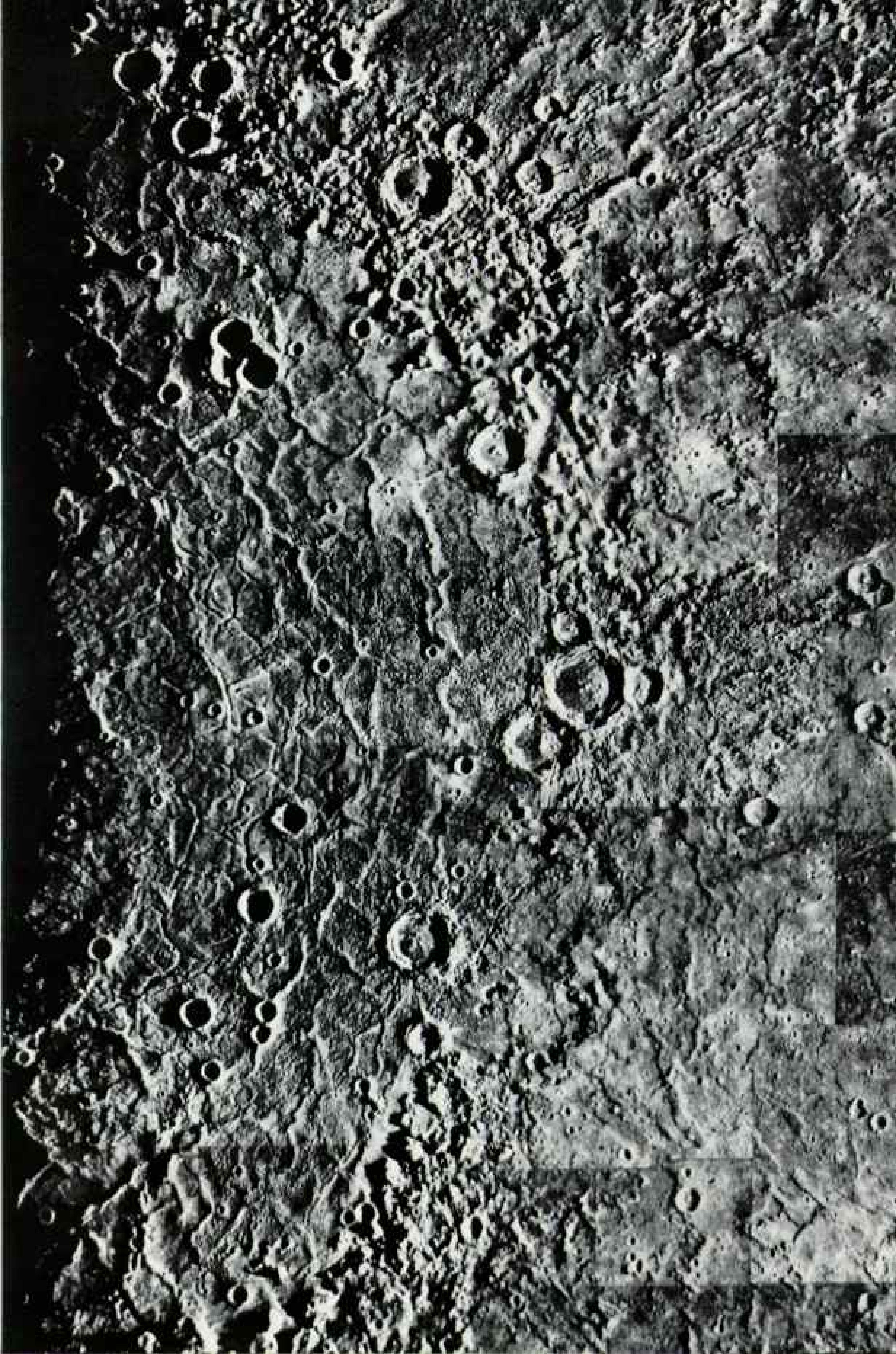
*The author described Pioneer 10's voyage to Jupiter in the February 1975 GEOGRAPHIC, and Mariner 9's trip to Mars in the February 1973 issue.

Awesome leap in mankind's knowledge: The face of Mercury, previously seen only as a vague and cottony orb (**left**), looks astonishingly like the moon in this photomosaic (**right**) transmitted by Mariner 10 from within 50,000 miles of the planet. Bristling with fact-finding instruments, the NASA spacecraft homed in on both of earth's inner sisters, Venus and Mercury.

NEW MEXICO STATE UNIVERSITY OBSERVATORY (LEFT) AND NASA



about a flame, so close that it is extremely difficult to view in the sun's glare. Visible to the eye only briefly at times just after sunset, or at other times just before sunrise, Mercury is so obscure that many astronomers have never spotted it.

And so excitement mounts about these two inner sisters of earth as evidence from spacecraft and earthbound instruments offers a startling new picture.

For years Venus was regarded as earth's twin sister, because the two are so nearly alike in size, mass, and density. It was once believed that Venus was a Garden of Eden with plentiful water and lush vegetation, and —most likely—inhabitants. A French man of letters, Bernard de Fontenelle, wrote in 1686: "I can tell from here . . . what the inhabitants of Venus are like; they resemble the Moors of Granada; a small black people, burned by the sun, full of wit and fire, always in love, writing verse, fond of music, arranging festivals, dances, and tournaments every day."

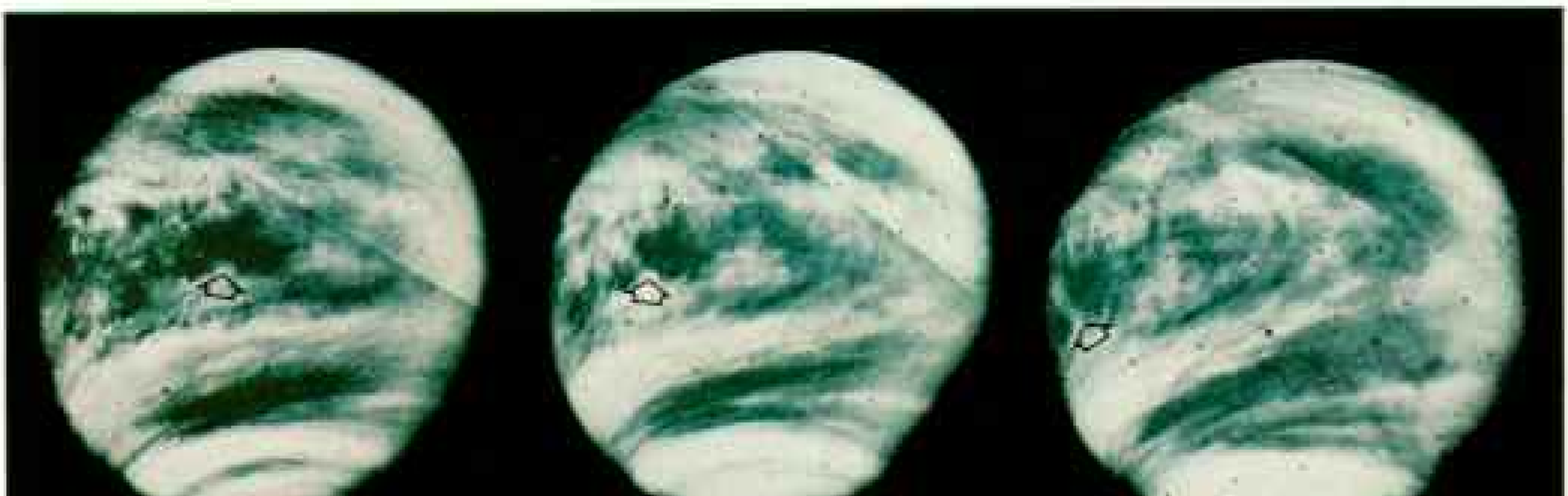
Now, after five Soviet and three United States spacecraft have observed Venus, with two Soviet craft successfully landing on the surface, and after studies by radar and radio telescopes, we know that the surface of Venus is an unlikely place for life of any kind.

No water. No free oxygen. And what is far worse, the surface temperature measures some 750° Kelvin (about 900° Fahrenheit),

Venus observed

IN ORDINARY LIGHT, the planet appears only as a dazzling disk. But photographed in ultraviolet by Mariner 10, Venus reveals a marbled visage of dark and light clouds (**facing page**), with blue tone added for clarity. Members of the Mariner television team, Dr. Michael J. S. Belton, left, and Dr. Bruce C. Murray, study a mosaic of Venus at the Jet Propulsion Laboratory in Pasadena (**right**). Already probed by the United States and the Soviet Union, Venus served as a "skyhook" whose gravity yanked Mariner 10 onto course for Mercury.

CHARLES O'REAR (ABOVE) AND NASA



Venusian trade winds? Arrows on three views taken at seven-hour intervals point to the same dark cloud as it races with other Venusian clouds from east to west at more than 200 miles an hour—some sixty times faster than surface rotation. Unlike most planets, Venus spins clockwise, opposite to its orbit around the sun.

radiating about five times the heat of your oven broiler. Such heat is enough to melt lead and zinc. Indeed, de Fontenelle's Venusians would be full of fire!

The atmosphere is no more friendly. A thick, deep layer of carbon dioxide, it is a hundred times as heavy as earth's atmosphere, so that it crushes with the weight of the ocean at a 3,300-foot depth.

The very density of the atmosphere keeps the intense heat evenly distributed about the planet, with only a few degrees' variation between day and night or between the equator and the poles.

Virtually all experts explain the furnace heat of Venus by the "greenhouse effect." Like the glass of a greenhouse, carbon dioxide traps sunlight by preventing its escape as heat. Water vapor does the same. This phenomenon, in fact, makes the average temperature of earth about 90° F. higher than it would be if our atmosphere contained no water vapor or carbon dioxide. But some scientists note that proposed greenhouse models, or theories, do not fully account for the terrible heat of Venus.

If man ever lands on Venus, he will have to be in some kind of armored, insulated bathyscaphe. That, in effect, is what the Soviet Union used for its unmanned spacecraft Venera 8. It landed in 1972 and for some 50 minutes transmitted data about temperature,

pressure, light intensity, and radioactivity in the soil.

What man could see there would probably be limited. Venera 8 reported that less than 2 percent of the sun's light penetrates the thick cloud cover and reaches the ground. Such light as does get through to the surface would be scattered in every direction by the myriad carbon dioxide molecules, softening any shadows or contrast. The limits of vision—especially if there is any dust—might be only a few hundred feet.

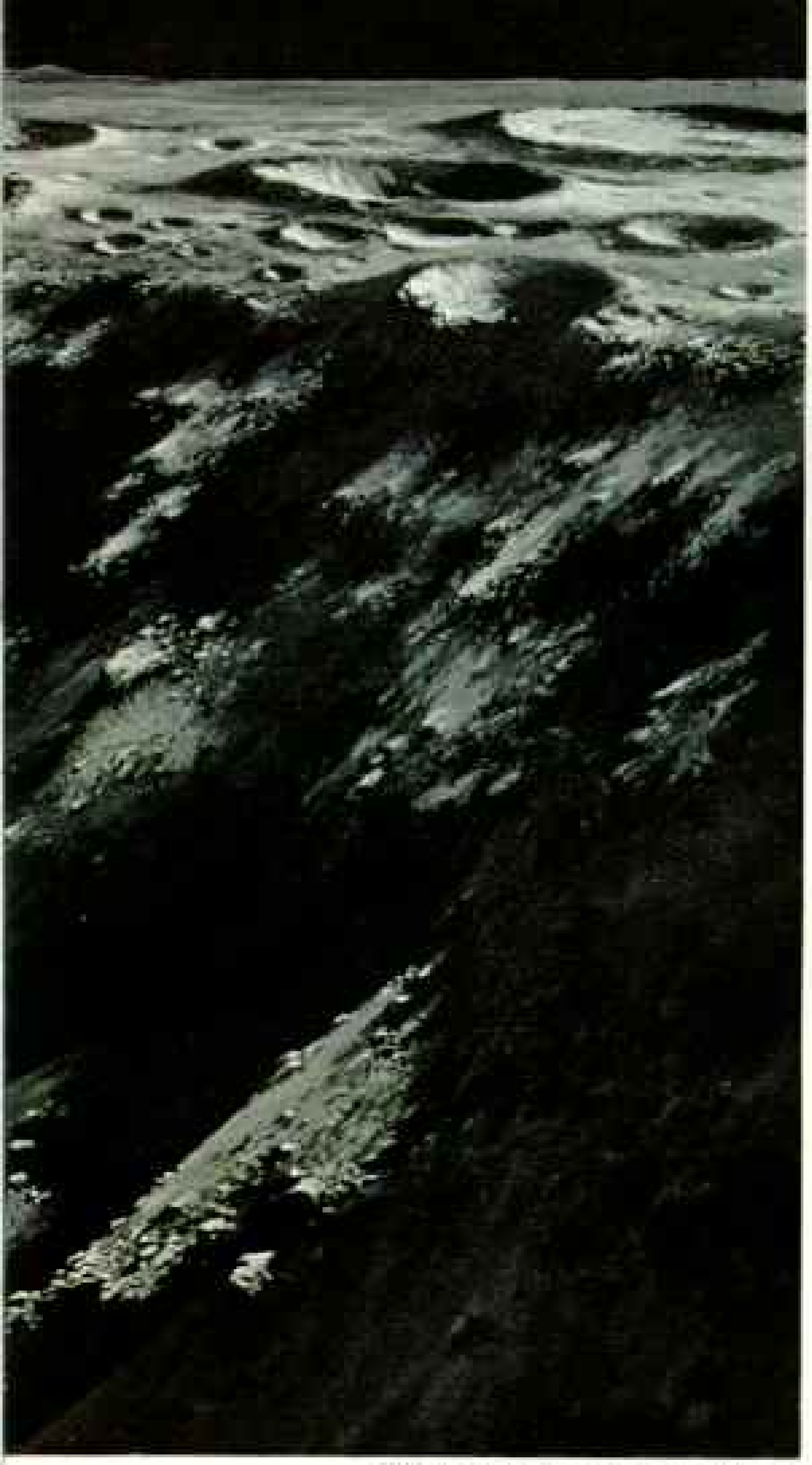
On a Clear Day, You Could See Forever

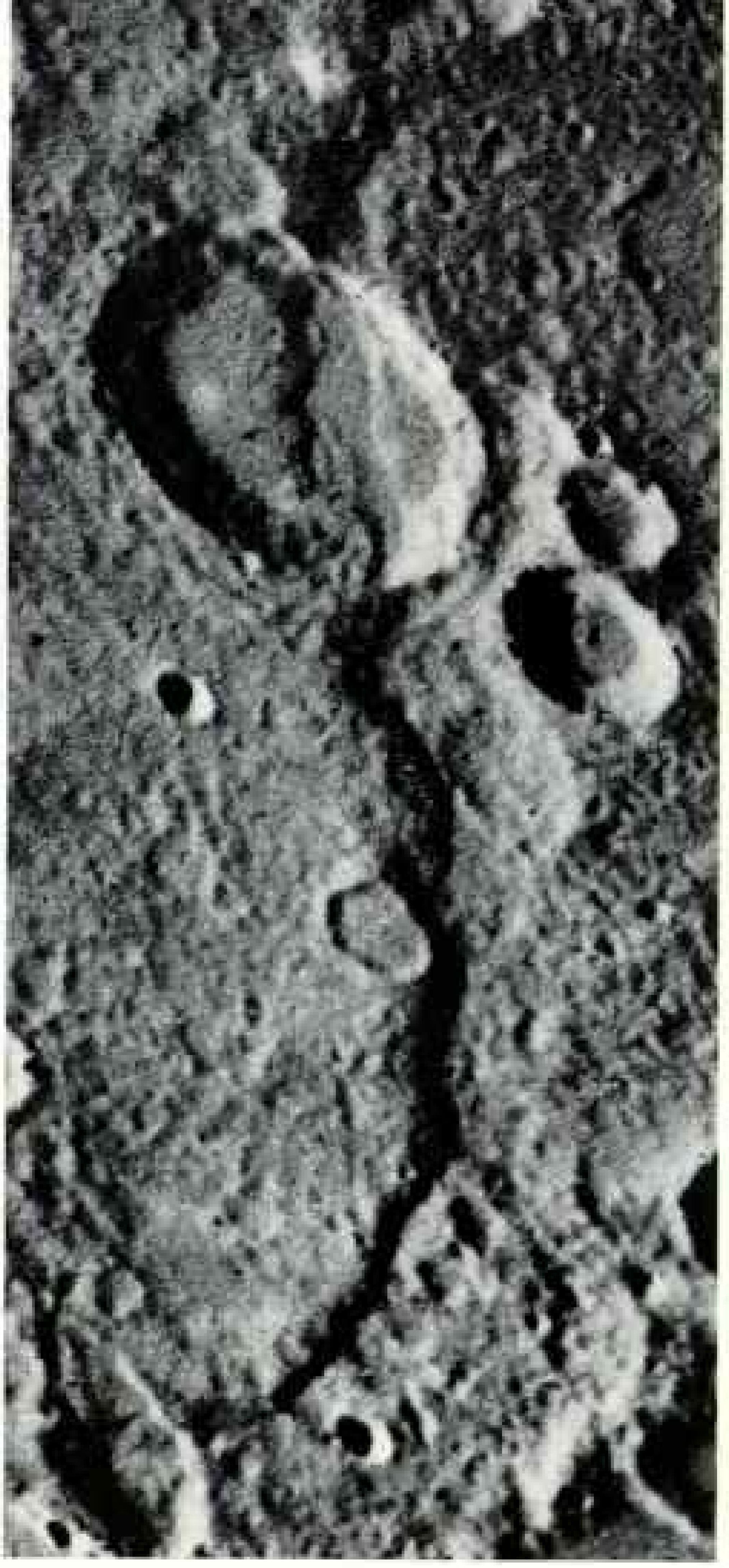
But suppose the Venusian atmosphere were clear. Then an observer would enjoy one of the strangest experiences of a lifetime. Because of super-refractivity, the acute bending of light rays by the ultradense atmosphere, one could in theory see all the way around the planet. In effect he would seem to be standing at the bottom of a bowl with the entire planet stretching up endlessly on every side.

"It would be," says Dr. Bradford A. Smith of the University of Arizona, "like looking through a fishbowl of clear water."

Recent radar observations begin to give us an idea of what the surface must be like. It seems to be generally smoother than the moon and gently undulating. Maximum variation in altitude measured so far is only about two miles, compared to 12 miles on earth. The soil in which Venera 8 landed appears to be friable and loosely packed. The rocks at Venera 8's landing site seem similar to terrestrial granite.

Craters as big as a hundred miles in diameter have been detected. But the craters seem quite shallow—one measures only a quarter of a mile deep.





PAINTING BY LUDEK PESEK; PHOTOGRAPH FROM NASA

If the hidden surface of Venus is still largely a mystery, so are its clouds. Mariner's findings, coupled with other observations, show clouds at high levels. Earth clouds normally rise no more than ten miles, but the tops of Venusian clouds—the only part we see—lie a good 40 miles high. Above them is a tenuous haze that persists for perhaps another 15 miles. No one knows the composition of the deep layers, but recent studies suggest that the cloud tops consist mainly of fine sulphuric-acid droplets, a mist more corrosive than the acid in an automobile battery.

Perhaps the most exciting result of Mariner's brief flyby of Venus is its detailed ultraviolet pictures of these cloud tops. Suddenly, when seen in ultraviolet wavelengths, the opaque, featureless "surface" becomes a realm of dark and light clouds. In the equatorial region they race at more than 200 miles an

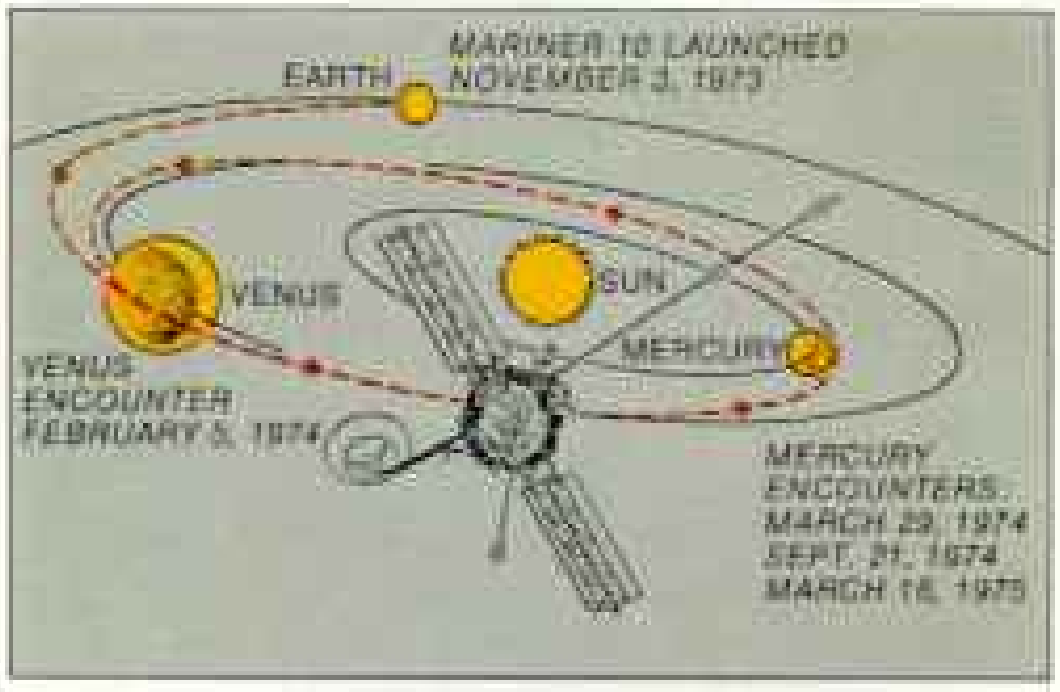
Mercury's mysterious cliffs

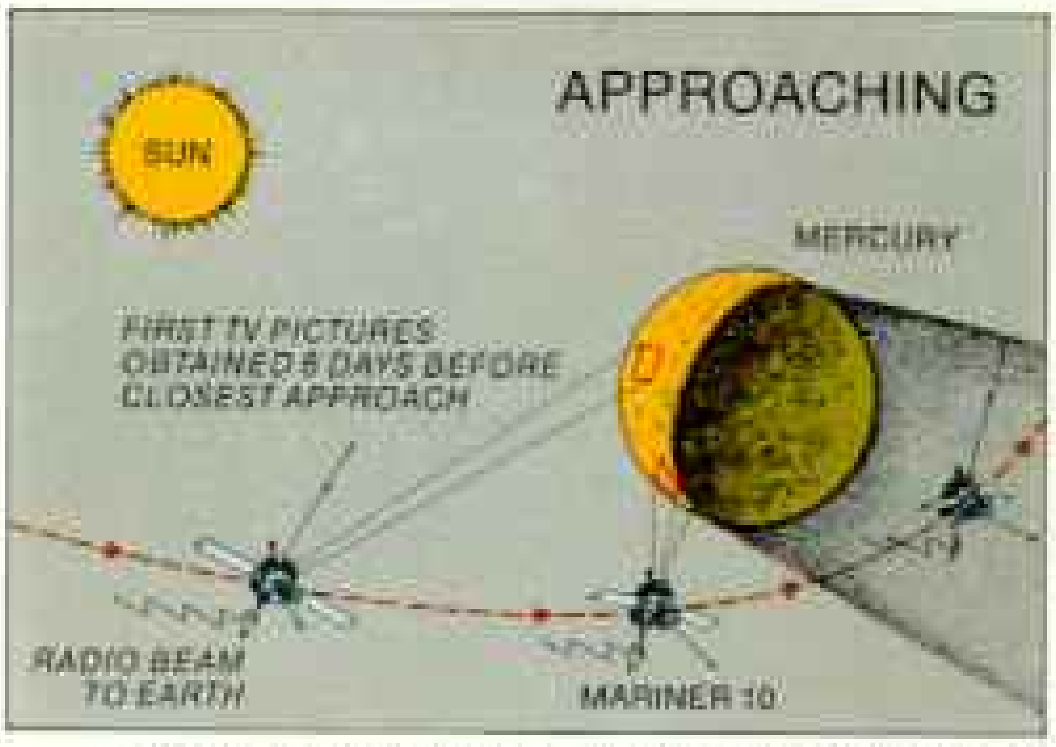
POSSIBLE CLUES to Mercury's early development are scarps up to two miles high. Called *rupes* (Latin for cliffs), they snake across the planet's surface for hundreds of miles, sometimes slicing through previously formed craters (**above**). Artist Pesek's close-up of the same terrain (**left**) shows the Discovery Rupes, named after the ship of British explorer Capt. James Cook. Such curved scarps—unknown on the moon—may have formed some four billion years ago when cooling and shrinking of the planet's heavy core crumpled the crust.

A bit like the moon, a bit like the earth

WINGING to within 450 miles of Mercury in its 146-day journey from earth, Mariner 10 swept its TV cameras across a realm of stark desolation and awesome complexity. Surface temperatures on this innermost planet—at times only 29 million miles from the sun—range from a midday 800° F. to −300° on the dark side. The planet has no atmosphere, and hence no atmospheric erosion like that which helped obliterate most of earth's craters eons ago.

A mixed personality, Mercury appears to have a heavily cratered, dusty surface like the moon's, and a large, heavy core of iron somewhat like earth's. This photomosaic (**facing page**), assembled from pictures taken by the approaching spacecraft from 124,000 miles out, reveals a heavily cratered portion of Mercury's surface. The first geologic map of the planet (**below**) shows varied terrain; the key also applies to the map on page 867.


EARTH
MARINER 10 LAUNCHED NOVEMBER 3, 1973
VENUS
SUN
MERCURY
VENUS ENCOUNTER FEBRUARY 5, 1974
MERCURY ENCOUNTERS: MARCH 29, 1974 SEPT. 21, 1974 MARCH 16, 1975


APPROACHING
SUN
MERCURY
FIRST TV PICTURES OBTAINED 6 DAYS BEFORE CLOSEST APPROACH
RADIO BEAM TO EARTH
MARINER 10

DIAGRAMS BY WALTER HORTENS, PHOTOGRAPH FROM NASA (FACING PAGE)

▨ 1. RAYED AND DARK HALO CRATERS

▨ 2. FRESH CRATERS AND BASINS

▨ 3. SMOOTH PLAINS

▨ 4. CALORIS MOUNTAINS

▨ 5. CALORIS LINEATED TERRAIN

▨ 6. HUMMOCKY PLAINS

▨ 7. HILLY AND LINEATED TERRAIN "WEIRD" TERRAIN

▨ 8. DOMICAL HILLS

▨ 9. AREA WITH LINEAR VALLEYS

▨ 10. HEAVILY CRATERED TERRAIN

▨ 11. OLD CRATERS AND BASINS

▨ 12. CRATERS CUT BY CALORIS LINEAMENTS

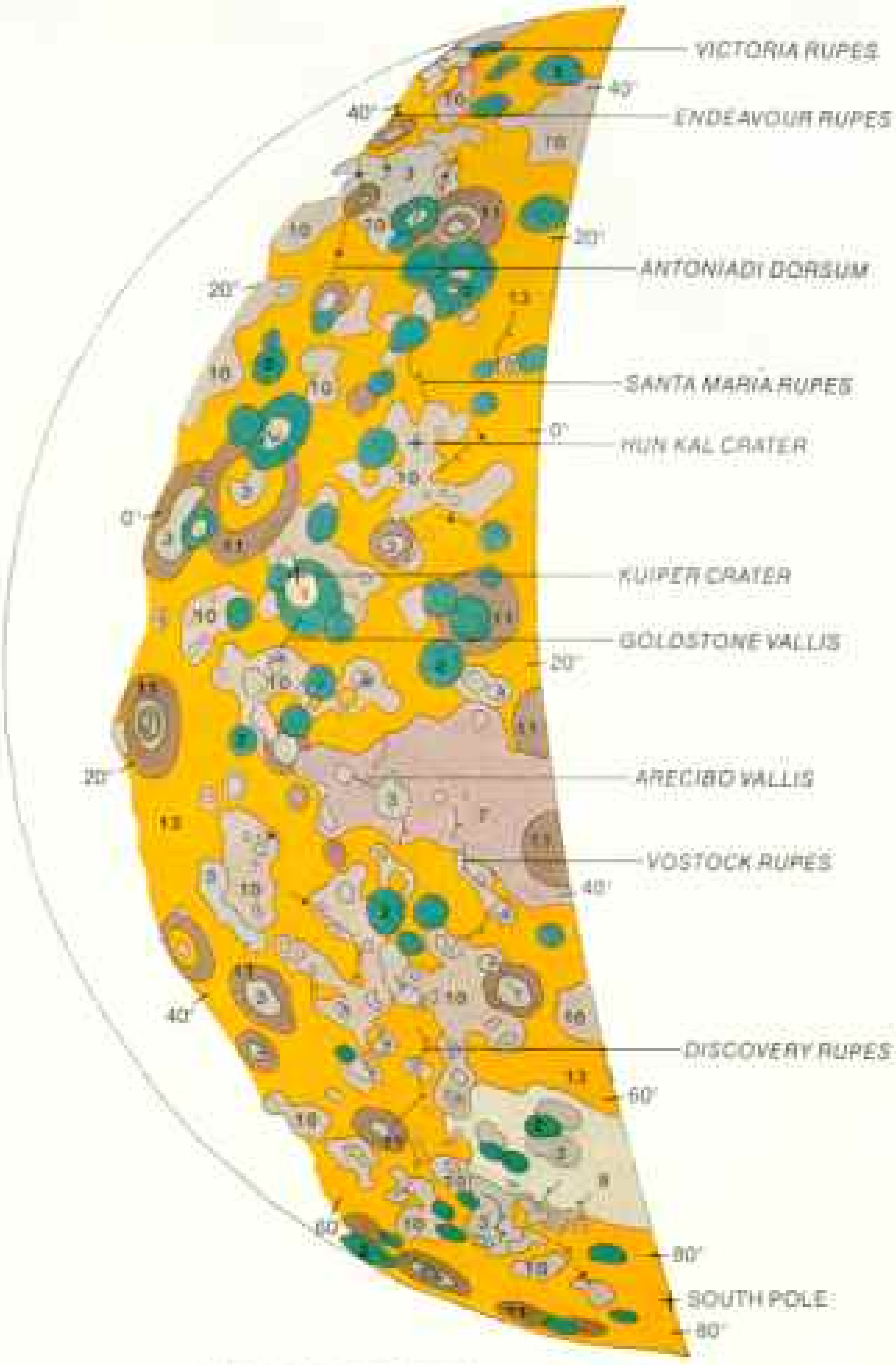
▨ 13. INTERCRATER PLAINS

DORSUM (RIDGE)

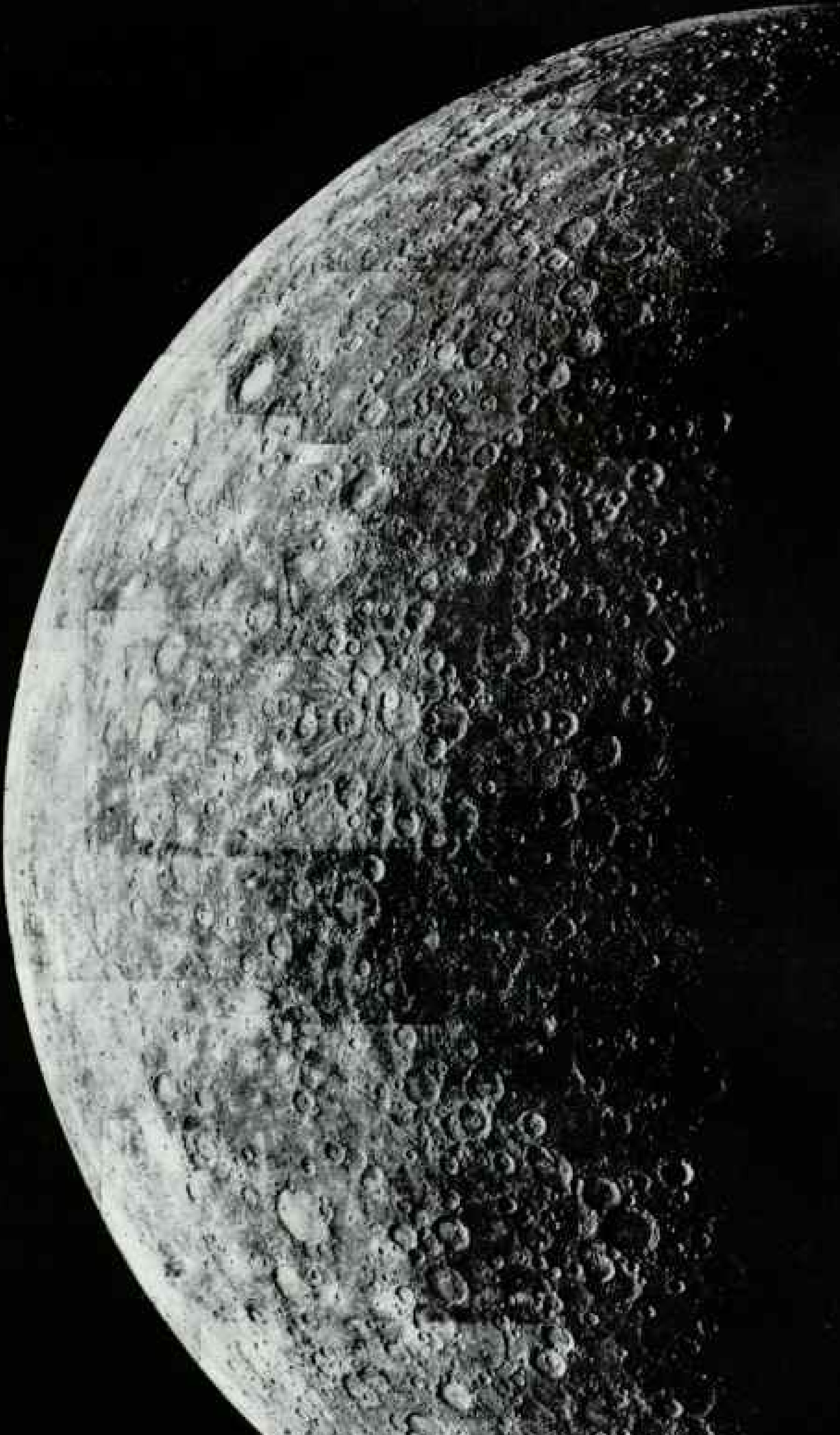
RUPES (SCARP)

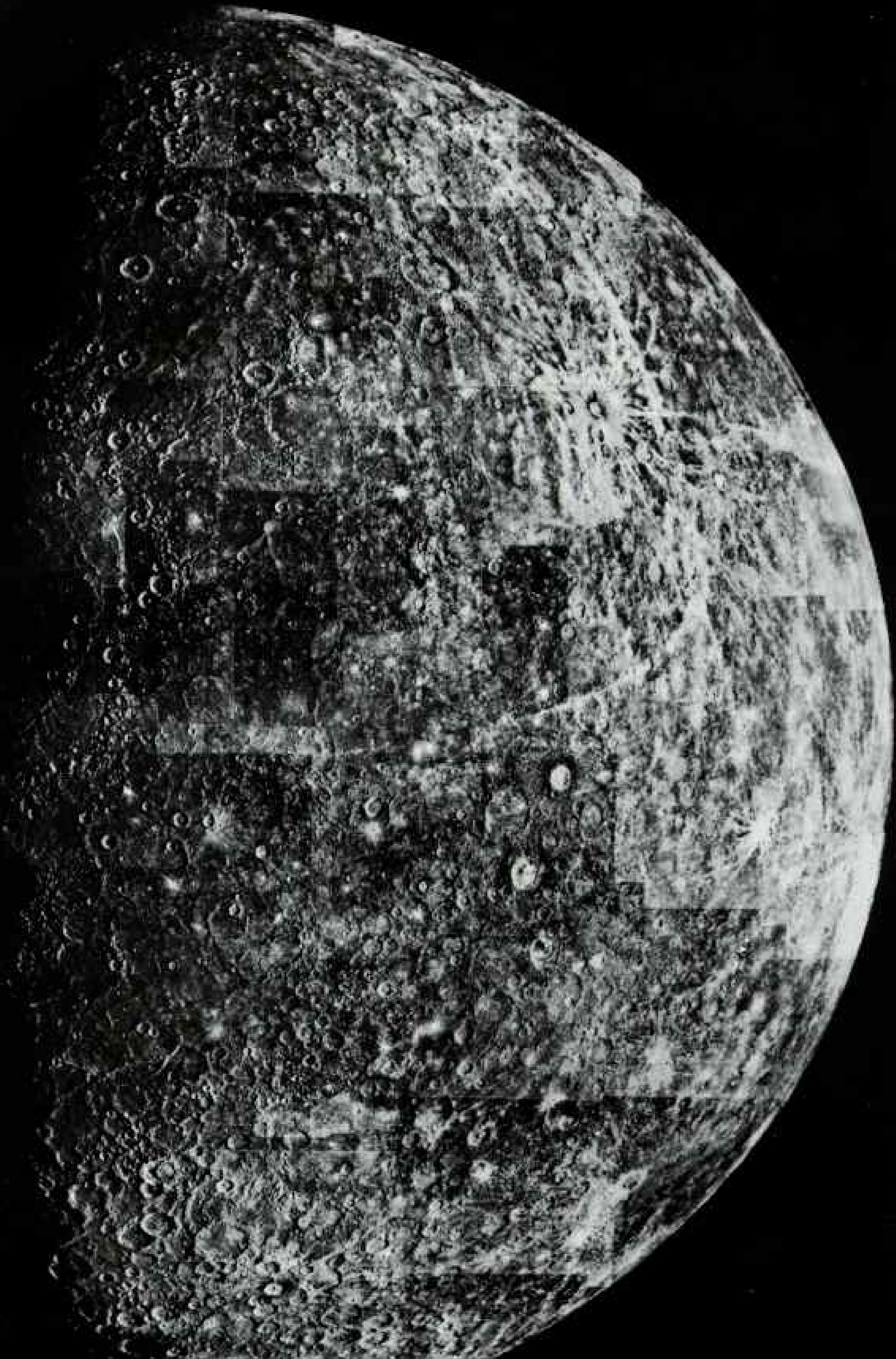
FRACTURE

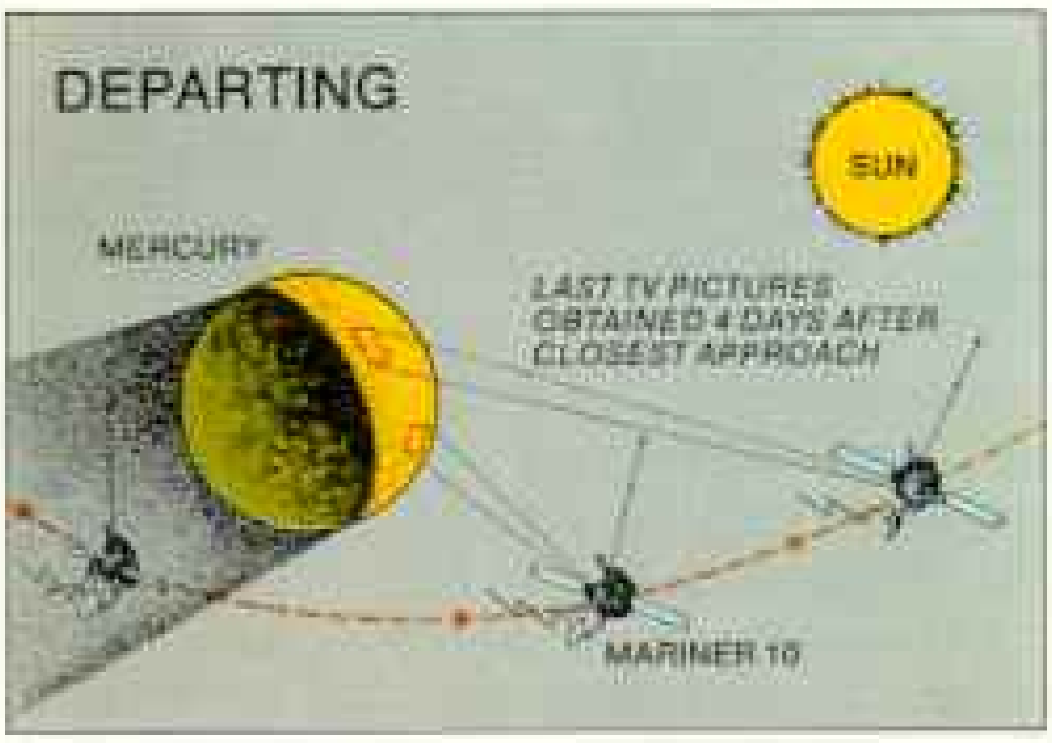
VALLIS (VALLEY)


VICTORIA RUPES
40°
40°
ENDEAVOUR RUPES
20°
20°
ANTONIADI DORSUM
SANTA MARIA RUPES
0°
HUN KAL CRATER
0°
KUIPER CRATER
GOLDSTONE VALLIS
20°
20°
ARECIBO VALLIS
VOSTOCK RUPES
40°
40°
DISCOVERY RUPES
60°
60°
80°
SOUTH POLE
80°

MAP BY U. S. GEOLOGICAL SURVEY; FEATURE NAMES PROVISIONAL







The view looking back: After swinging around Mercury, Mariner 10 beamed signals for an image of the other side (**left**) from 130,000 miles out. This portion displays comparatively fewer craters and more smooth plains, called *planitiae*. Bright rays, materials either ejected or exposed by the gigantic impact of colliding bodies, spread across hundreds of miles from some of the more recent craters.

PHOTOGRAPH FROM NASA (FACING PAGE); DIAGRAM BY WALTER HORTENS

hour, moving completely about the planet in only four days.

This swift rotation of Venus's clouds becomes all the more puzzling against another of the mysteries of Venus—the extremely slow and unexplained rotation of the planet itself. While earth turns on its axis once a day, Venus turns lazily—and in the opposite direction—once every 243 earth days. At the same time, it revolves about the sun once every 225 earth days. The combination gives the planet a solar day (that is, from one sunrise to the next) of 117 days. And the sun rises in the west and sets in the east, although an earthling in this murky world would never know the difference.

Why is Venus so different from the earth? It is, of course, nearly 30 percent closer to the sun, receives twice as much solar radiation, and rotates much more slowly. But the greatest difference seems to be the atmosphere of more than 95 percent carbon dioxide that makes Venus such an inhospitable place.

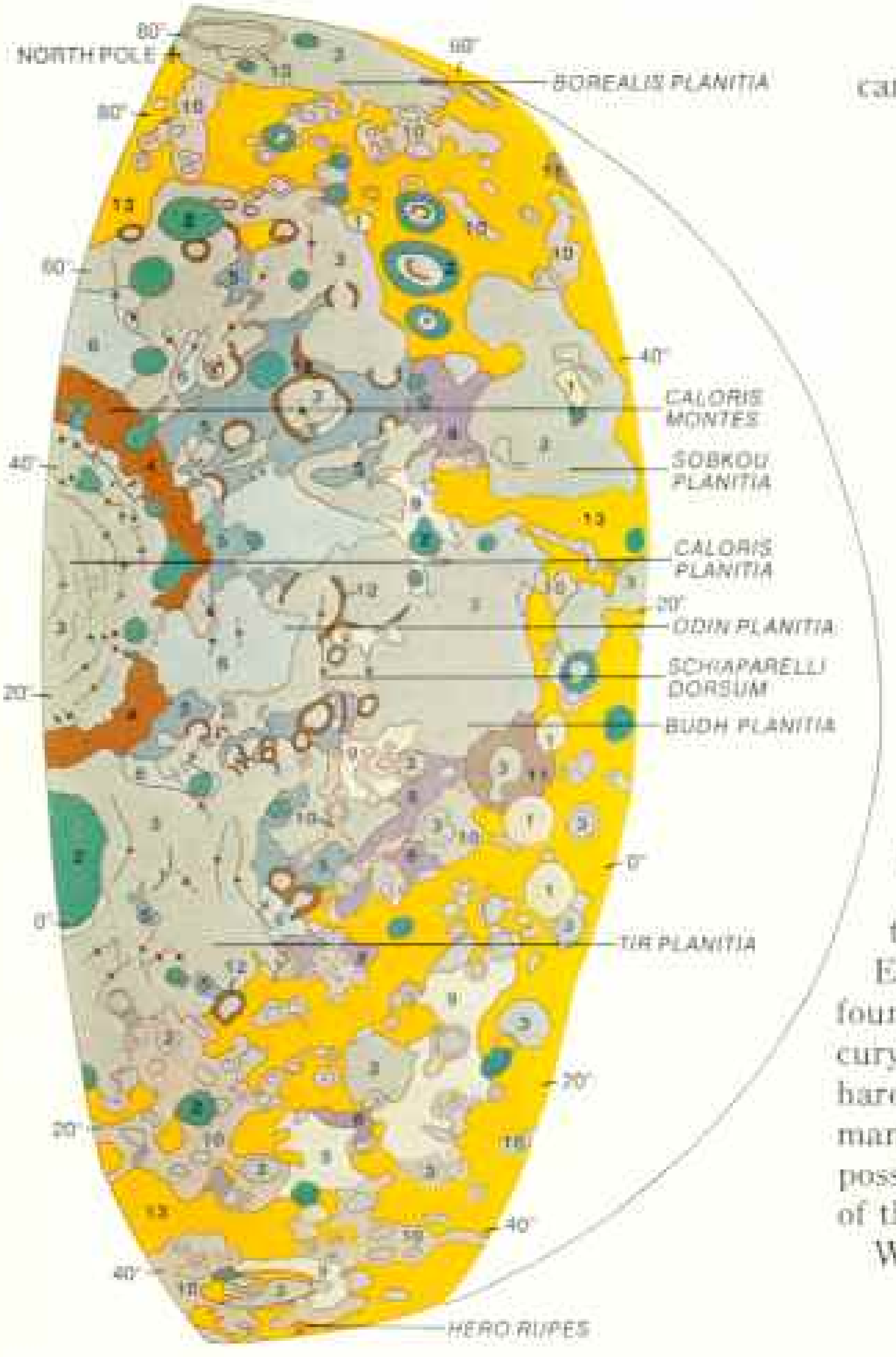
Yet our earth has produced just as much carbon dioxide as Venus has. In the oceans, which Venus seems to lack, our carbon dioxide combines with calcium and magnesium from silicate rocks to form carbonates. Virtually all earth's carbon dioxide is now in the crust, much of it locked away in vast deposits of limestone, including the accumulated skeletons of myriad tiny sea creatures. What is present in gaseous form accounts for only .03 percent of the atmosphere.

So, earth has become the Garden of Eden, a haven of life. But Venus, "mistress of heaven" to the ancient Babylonians and namesake to the Romans of their goddess of beauty, is a grim and lifeless inferno, hidden behind a mask of vitriol.

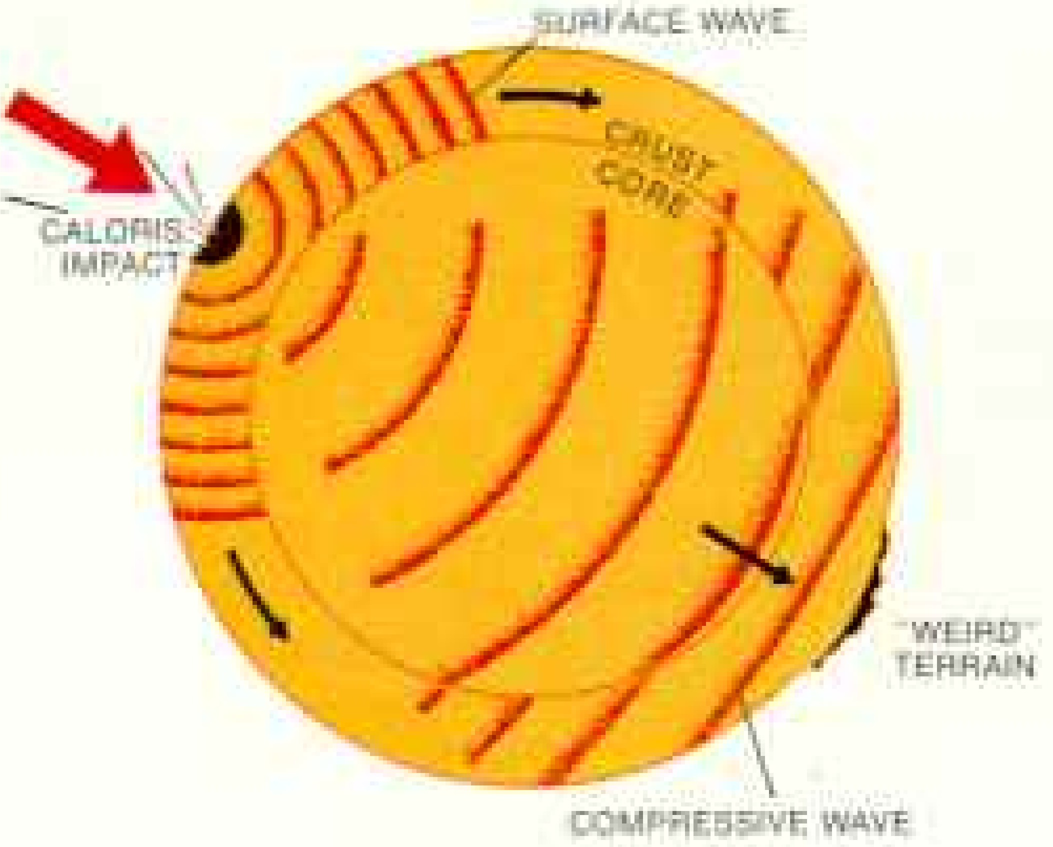
As Mariner 10 swept around Venus, gravity swung the little spacecraft in a path toward Mercury, the innermost planet (diagram, page 864), and a region exposed to much more violent blasts of the sun's radiation and the solar wind.

Earlier radar observations had already found what seemed to be cratering on Mercury's surface. Nevertheless, scientists could hardly avoid a sense of elation as they awaited man's first closeup look at the smallest (except possibly for Pluto) and one of the least known of the planetary family.

Would the planet be active? Volcanic?



MAP BY U. S. GEOLOGICAL SURVEY; FEATURE NAMES PROVISIONAL



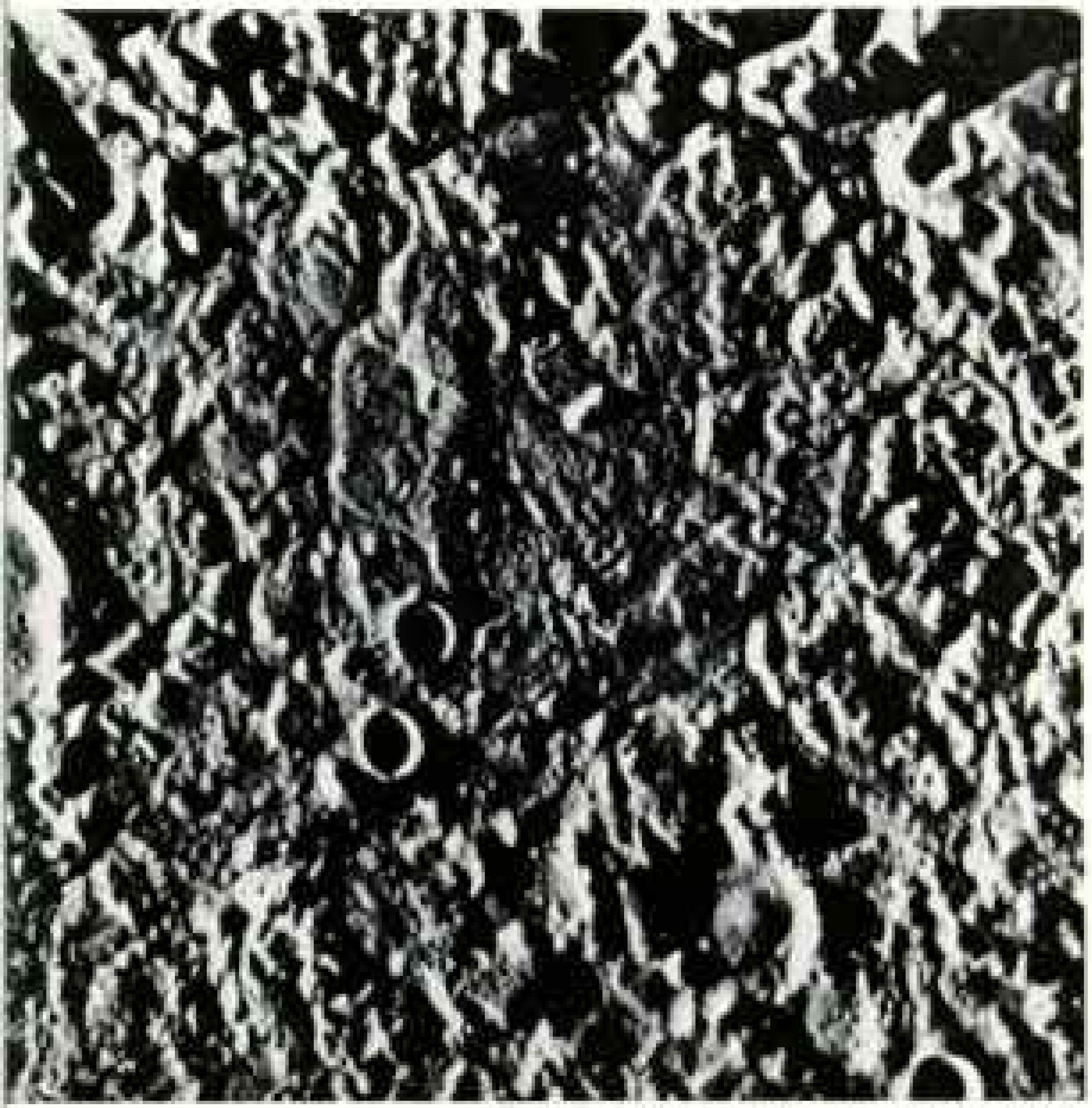


DIAGRAM BY WALTER HORTENS; PHOTOGRAPH FROM NASA

Scab from a planet-shaking blow? This 5,800-square-mile section is part of a region of rough hills and tumbled walls of craters lying directly opposite Mercury's 800-mile-wide Caloris impact basin (partly visible on page 859, left center). Such "weird" terrain has not yet been found elsewhere on Mercury—though similar forms exist on the moon opposite great crater basins. The diagram (**top**) illustrates the most recent theory of the terrain's origin: When a huge meteorite collided and created the Caloris basin, fast-moving compressive waves moved through the planet, followed by slower surface waves. They converged at a point opposite Caloris, shattering land forms and leaving the area a shambles.

Would there be any detectable atmosphere?

The entire incoming side of the planet was a heavily cratered surface (page 865), much like the lunar highlands. Then, passing the other side, Mariner saw a different type of terrain—a less heavily cratered area with what appeared to be extensive volcanic flooding (page 866), similar to the lunar maria. To everyone's surprise, Mercury, like both Mars and the moon, is two-faced.

It is clearly a fossil landscape, according to experts. Huge basins, the scars of gigantic impacts when the planet was very young, show no signs of erosion from water or wind. Thus, says Professor Bruce C. Murray of the California Institute of Technology, chief of the Mariner 10 television team, "We believe that Mercury has not had any sensible atmosphere for at least four billion years."

But if there is no atmosphere, Mercury possesses something else that was quite unexpected—a magnetic field. Though only about one percent as strong as earth's, it is still a fair-size magnetic field for a slowly rotating planet much smaller than the earth.

New knowledge about Mercury, coupled with what we have learned from exploration of the moon and Mars, holds intriguing implications about the origin and geological history of the earthlike planets.

It now seems likely that all the planets from Mars inward suffered heavy bombardment, such as created the familiar cratered face of the moon, and at the same time. On earth, of course, evidence of this cratering has long since been erased by erosion, volcanism, and crustal movement.

Dating of moon rocks demonstrates that the bombardment ended there somewhat abruptly about four billion years ago, 600 million years after the planets began to accumulate from the solar nebula, or cloud. Did the collisions of planets with smaller objects continue steadily throughout those 600 million years? Or was there a separate late flurry of collisions, perhaps with pieces of a large asteroid that broke up about four billion years ago? Scientists' opinions vary.

New ideas about a very large core inside Mercury reinforce recent speculation that the earth's core formed when the planet accreted, not by later melting as was once generally believed. The reason is that if Mercury's heavy core formed by later melting, it would have led to destruction of the huge craters we still see on the surface.

Astronomer-geologists are now having a field day proposing names for features on the virgin map of Mercury. Two major ridges, to be known as *dorsa* (spines in Latin), will be named for the famed planetary astronomers Schiaparelli and Antoniadi. Valleys will bear the names of radio telescopes, such as Goldstone Vallis for the 210-foot dish in the Mojave Desert that played the major role in tracking Mariner, and Arecibo Vallis for the huge 1,000-foot dish in Puerto Rico.

When Mariner was still far from Mercury, the first feature to be seen in the television pictures was an exceptionally bright, though indistinct, area. A crater in the middle of that area is now called Kuiper. It honors the late Professor Gerard P. Kuiper of the University of Arizona, a towering figure in planetary astronomy and a member of the Mariner 10 TV team before his death in 1973.

Another crater, only a mile wide, bears a special name—Hun Kal, which means 20 in ancient Mayan. The crater marks precisely the 20th meridian on Mercury's new map. Hun Kal will serve as the reference point for Mercury as Greenwich, England, does for the coordinate system of the earth.

Shrinking Core Makes Huge Cliffs

Some of the most interesting features seen so far on Mercury are the numerous giant curving cliffs, some running for hundreds of miles, cutting across crater walls and floors, and rising as high as two miles. They are to be called *rupes* (Latin for cliffs), and will be named for famous ships of exploration such as Captain Cook's *Endeavour* and *Discovery* and Columbus's *Santa Maria*.

Why should Mercury have such great scarps when neither the moon nor Mars shows similar features on such a scale? The answer seems to lie in Mercury's core. Scientists have long known that Mercury is almost as dense as earth even though its mass is only 6 percent that of earth. Such a high density in so small a planet argues that Mercury could have a very heavy core of iron constituting some three-quarters of the planet's diameter. Mariner 10 scientists now suspect this to be the case, and they explain the great scarps as resulting from compressive stress in the outer layer when Mercury's core shrank slightly, early in the planet's geological history.

This view of Mercury suggests that it is very much like the moon outside but like the earth inside. That comparison is further borne out by evidence that the Mercurian surface is everywhere blanketed with a layer of insulating dust—porous and compressible material much like the lunar soil.

Biggest of Mercury's features are the giant basins—at least 18 of them more than 120 miles in diameter. Like the lunar basins, many are filled with lava flows. Such flat areas will be listed as *planitiae*, or plains.

Most prominent of all is Caloris, a truly huge impact basin 800 miles across, with a floor fractured and marked by ridges. The name (from Latin *calor*—heat) derives from the fact that Caloris is close to one of Mercury's two "hot poles."

Like a Noonday With Ten Suns

Imagine a summer day with ten suns shining at once in the noon sky—that would approximate Mercury's blistering temperature at its peak—about 700° Kelvin (800° F.).

Because the planet follows a relatively elliptical orbit with an unusual combination of rotational and orbiting speeds, the apparent movement of the sun through Mercury's sky is quite strange. At perihelion, the point where Mercury passes closest to the sun, the sun stops, goes back more than one degree, then starts up again. This erratic little dance takes about an earth week.

During that time, the surface directly beneath the noon sun gets baked longer. It is thus called the "hot pole." Two spots, one near Caloris, share this dubious privilege on alternate perihelions.

Such searing temperatures cannot be easily maintained in the absence of an atmosphere; they fall off rapidly. Calculations suggest that just before dawn the surface of the planet registers 90° Kelvin (about 300° below zero F.). Thus the temperature excursion from charred noon until frozen dawn would be an incredible 1,100° F. No other planet suffers such a range.

Mind-boggling facts such as these begin to give us some appreciation for that little scarred, airless, and scorched cinder we call Mercury. More important, they add steadily to our understanding of our own earth. As Bruce Murray puts it:

"We have viewed a new world. Mariner 10's long reach across space has magnified our view of Mercury's surface 5,000-fold and transported us back in time to the very formation of the terrestrial planets. Further . . . exploration of Mercury can sharpen and expand that view of the past, our past." ☐

Four new books

Handcrafts, Inca Empire, The Universe, The Rockies

The Craftsman in America

BOTH BY LOWELL GEORGIA

Talented hands shape earth's materials in *The Craftsman in America,* first of four new Special Publications to be offered in 1975-76. A Tennessee cooper fashions a cedar churn (**top**), a graceful pitcher emerges from Georgia clay (**above**), and a wooden eagle comes to life in Wisconsin (**right**).

EACH OF US today can call on magical servants that would put Aladdin's genie to shame. Computers solve our problems in milliseconds. Jet airliners flash us across oceans between breakfast and dinner. An incredible array of sophisticated machines stands ready to serve us.

Then why are we turning back to the old ways? Why are there so many handlooms and potter's wheels and carving tools in use today?

In part, it is our reaction against all those technological miracles surrounding us. But even stronger is our innate urge to create. We take a block of wood, a lump of clay, or a skein of wool. Under patient hands these raw materials take form, gain beauty, become distinct objects in this age of duplication. We find infinite satisfaction in the process.

The Craftsman in America—first in the new series of four National Geographic Special Publications—will give you a new understanding of that way of life.

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Incas
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"Sons of the Sun," Inca lords protected a gold-rich empire with citadels such as Machu Picchu in the Peruvian Andes (**top**). *The Incredible Incas and Their Timeless Land* recounts a civilization's rise and fall.

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That same gold sowed the seeds of their destruction. Even the incredible Incas could not withstand the bearded foreigners who came astride horses, bearing weapons of thunder. The Spaniard Francisco Pizarro and his conquistadors garroted the ruling Inca, Atahuallpa, sacked the capital city of

WILLIAM C. SCHOENING (LEFT) AND JOHN LUTNES, BOTH WITH KITT PEAK NATIONAL OBSERVATORY

Cuzco, and brought a glorious empire to ruin.

Next will come *The Amazing Universe*. Written for the layman, this book looks into our seemingly peaceful skies and finds cataclysmic turbulence there.

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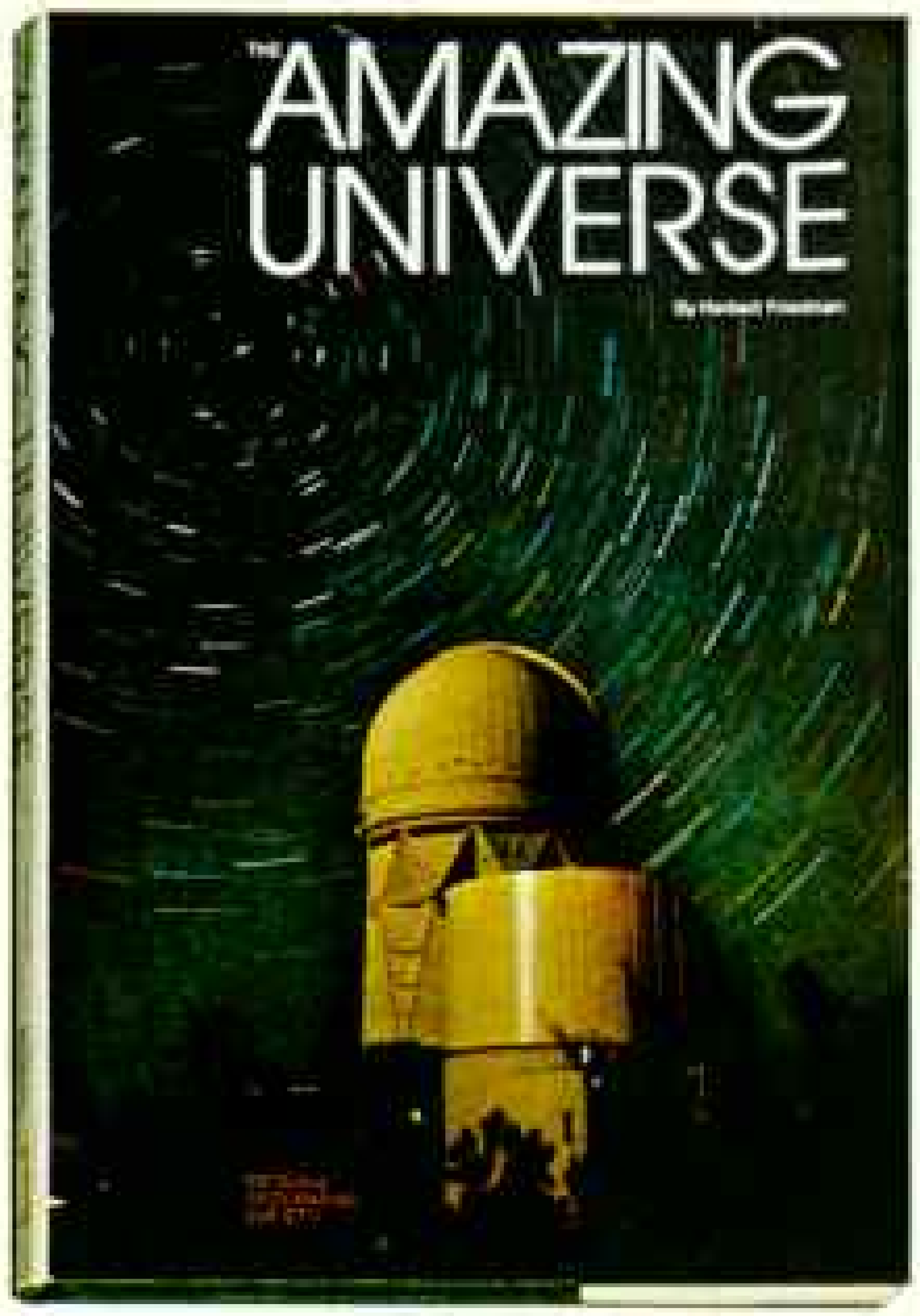

Fragment of a grand design, the Orion Nebula (**top, left**) reveals its secrets through the mirrors of giant telescopes, such as the one being readied at Kitt Peak National Observatory (**top, right**). Travel the Milky Way and beyond in *The Amazing Universe*.

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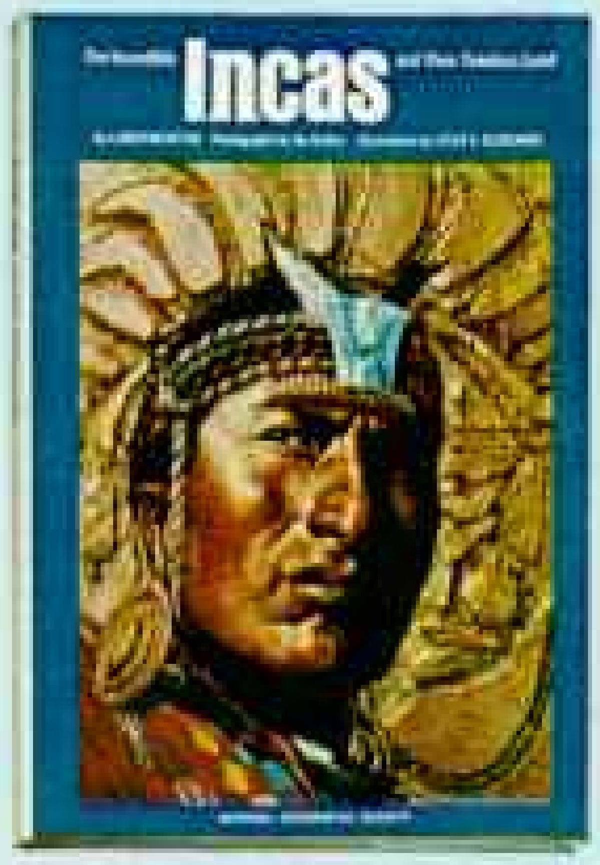

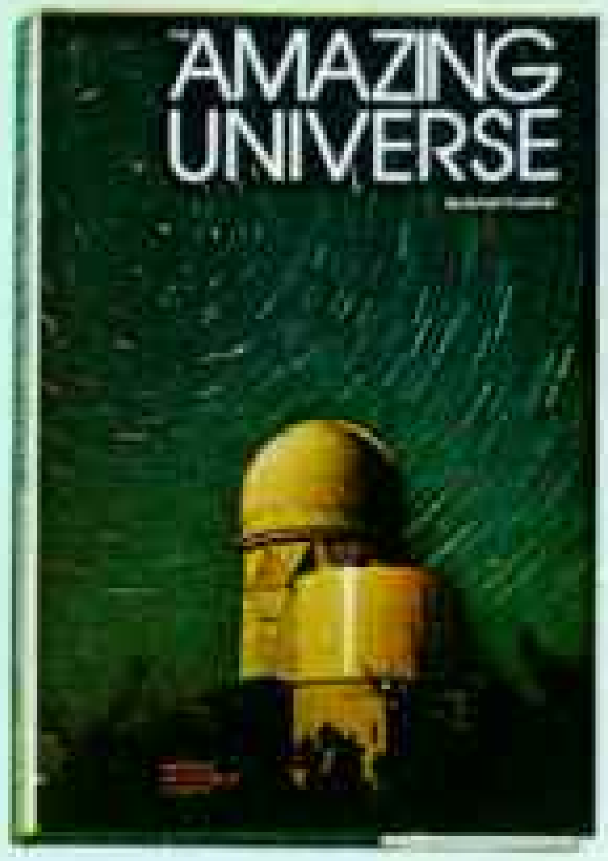

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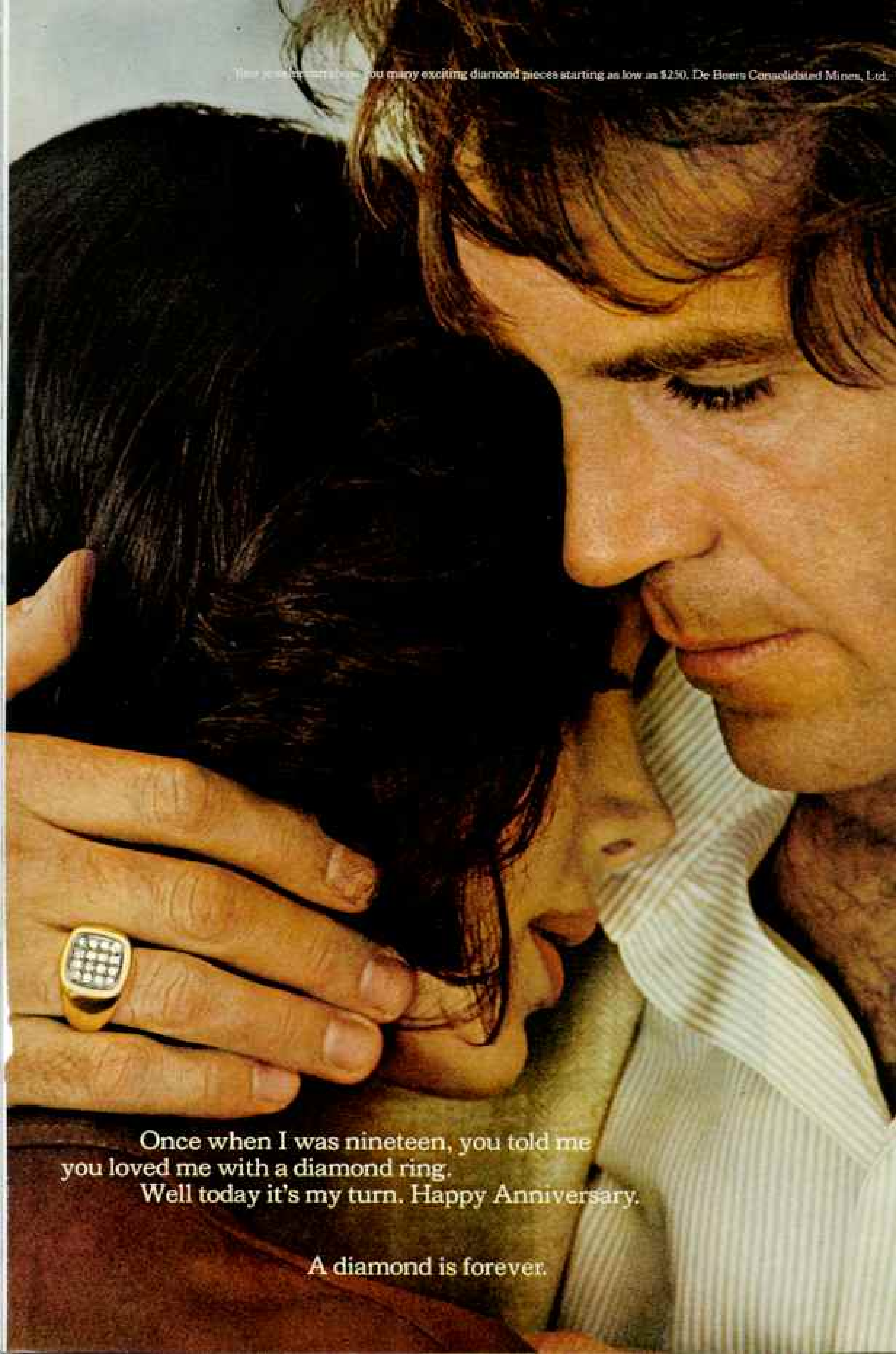
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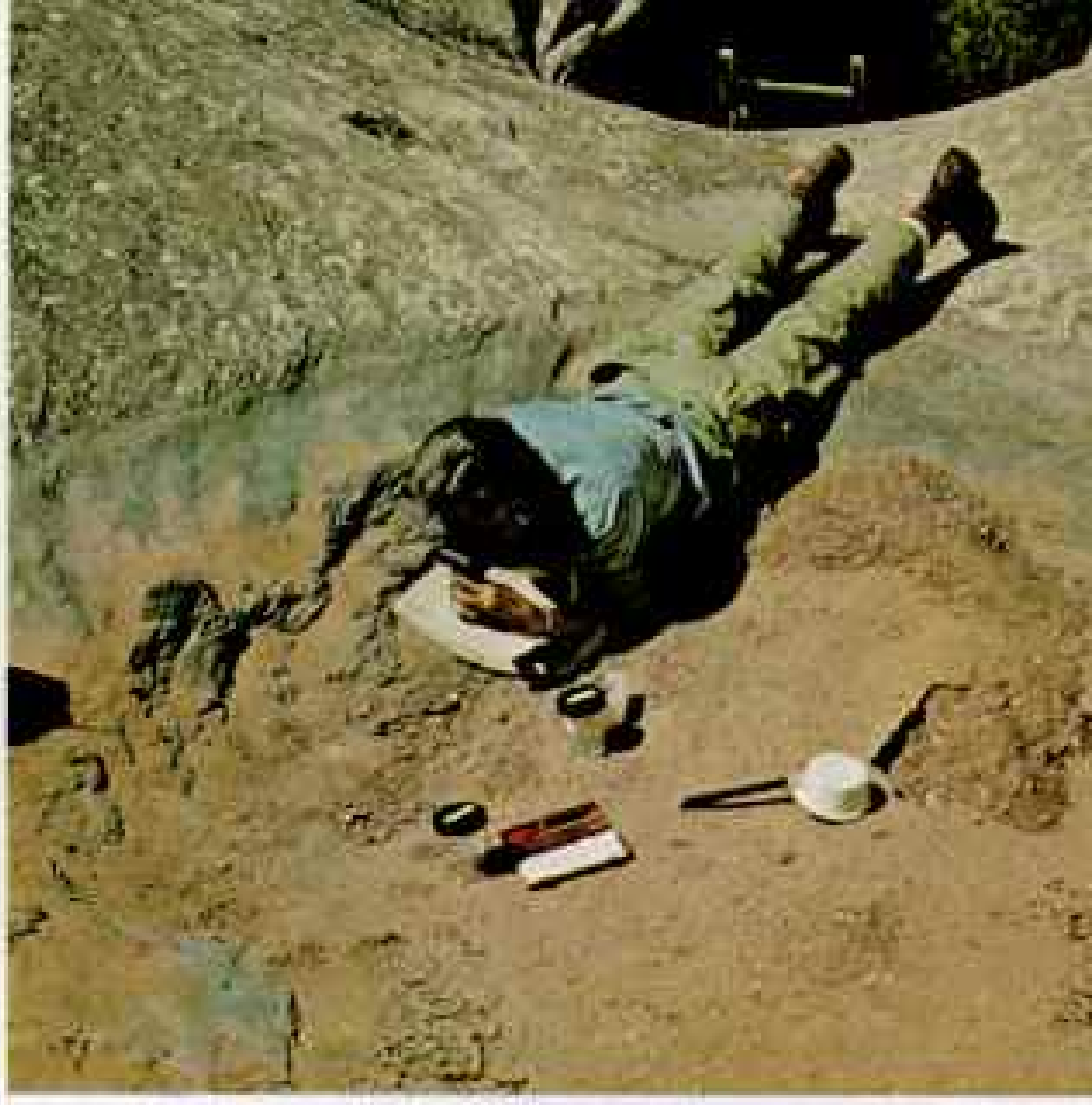
Postmortem on a pothole

All is dust and death now in a Utah pothole where only days before a watery realm sheltered lively life. With camera, dissecting kit, and specimen jars, National Geographic natural science photographer Robert F. Sisson (**right**) combs the sands of the arid rock basin to document the intermeshing forms of life that lately thrived there: thousands of individuals and scores of species ranging from microscopic animals and plants to such "giants" as half-inch-long predacious beetles and inch-long tadpoles.

Among the pothole's most captivating citizens, clam shrimp mate in a water ballet (**lower right**). The male grasps the female's side and propels her in giddy glides, dips, and swerves, pausing only to fend off a competing male.

With the evaporation of the pothole's last moisture, such small creatures struggle and die. But the appearance of total death deceives. The clam shrimp, gnats, mosquitoes, and others have planted the sand and rock cracks with the seeds of new generations—as eggs or dehydrated larvae. Through days, weeks, or months, the rock basin remains empty, exposed to winter's sub-zero cold or summer's 150° surface heat. Then rains return, the hole fills, the water warms, and in minutes or hours life again abounds.

You will make a longer visit to Utah's amazing potholes in a future GEOGRAPHIC. Invite friends to accompany you by nominating them for membership.



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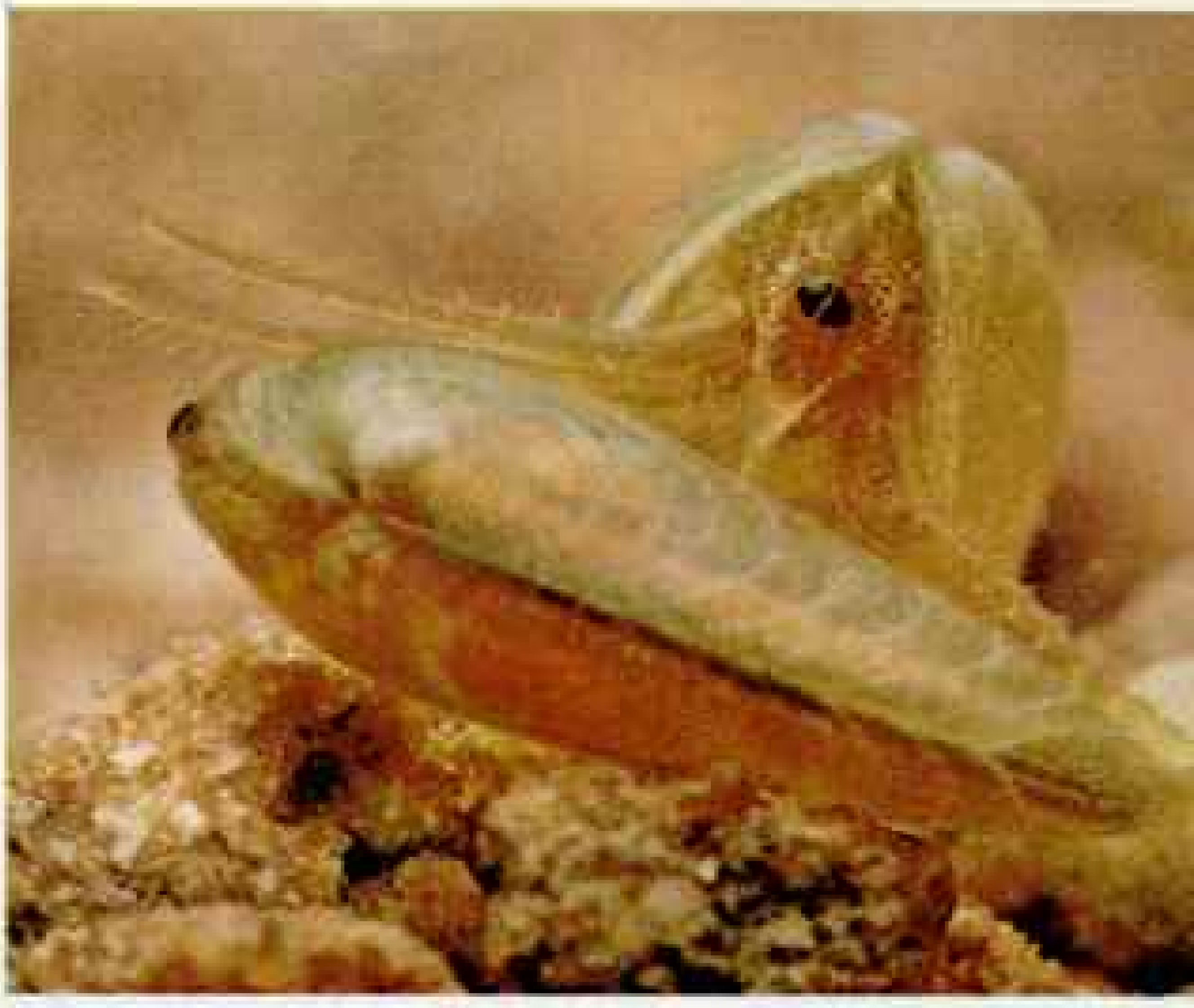

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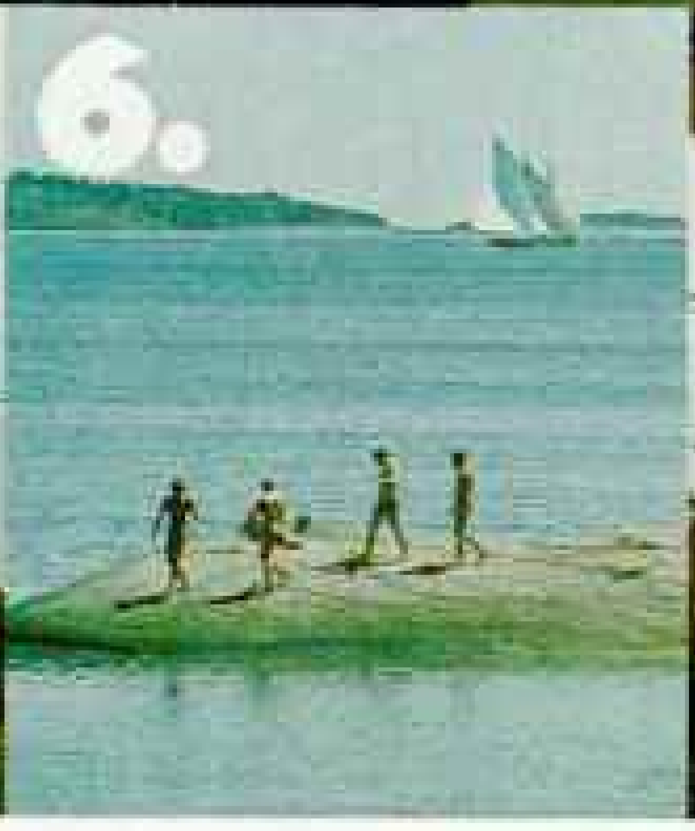
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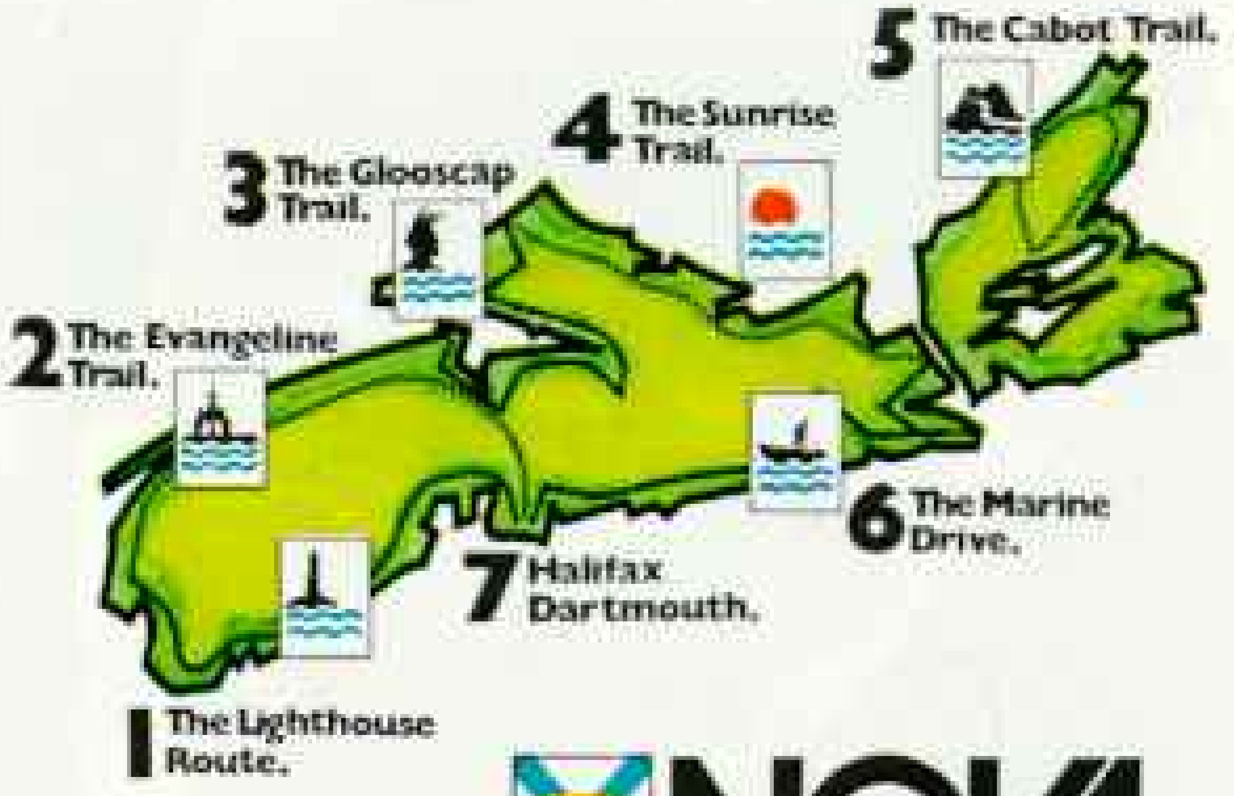

NOVA SCOTIA

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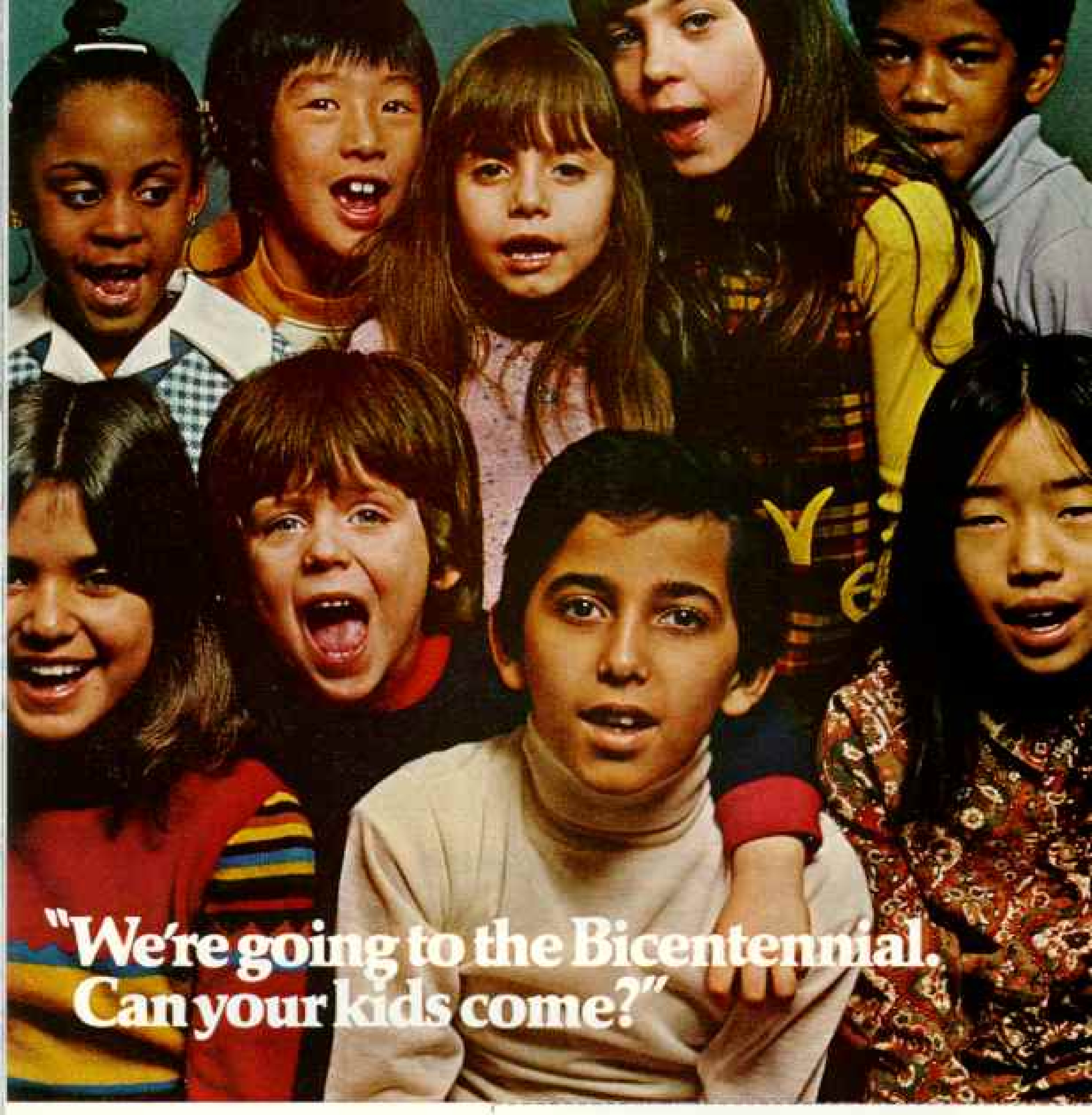
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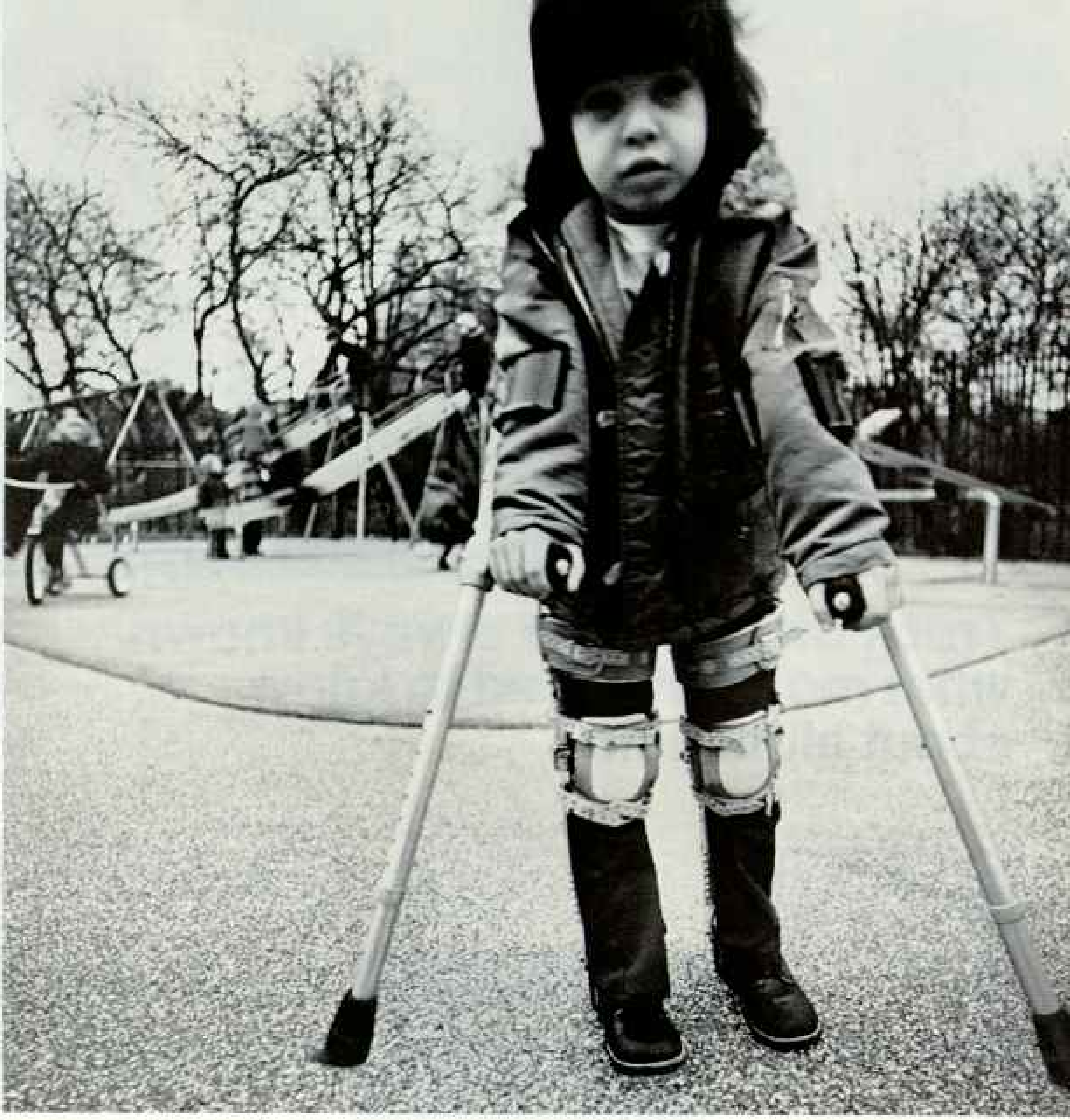

If you forget to have your children vaccinated, you could be reminded of it the rest of your life.

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Parents who don't have their children immunized against polio are risking a senseless tragedy. We only raise the point here because that's exactly what many parents seem to be doing.

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The best way to make sure is to see your family doctor. He can help you check on which immunizations your children may have missed, and then see that your children get them.

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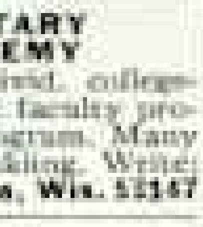

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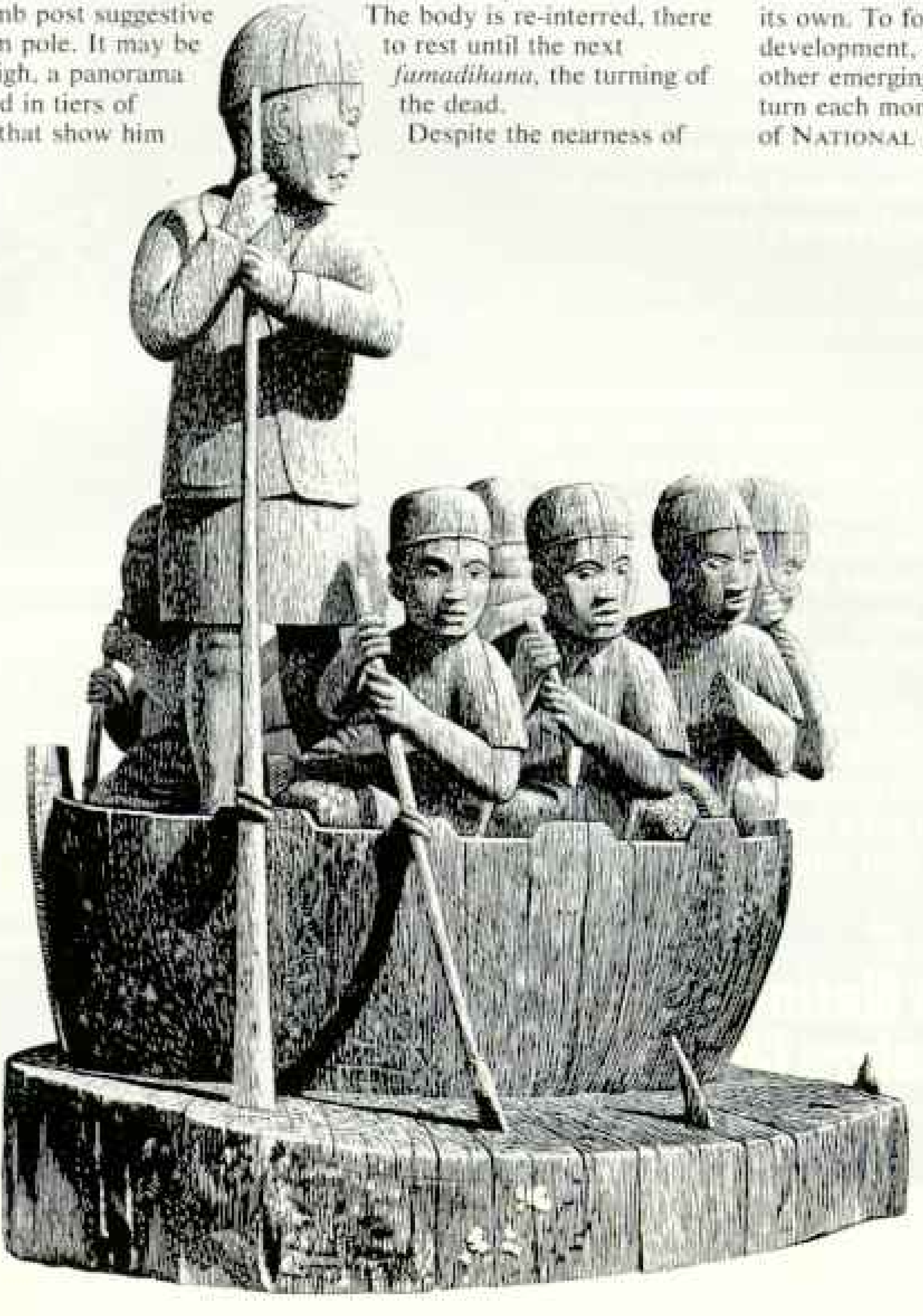
Such Madagascar "tombstones" celebrate life in the Malagasy Republic. One depicts a man beating a drum, another a herdsman tending his cattle. A carving of an airplane denotes that the person entombed once flew. Malagasy chieftains rate a tomb post suggestive of a totem pole. It may be 30 feet high, a panorama of life told in tiers of carvings that show him hunting, protecting his family, slaughtering a zebu, even making love.

Though nominally Christian, the Malagasy cling to ancient beliefs, holding that ancestors dictate health, wealth, and fertility of descendants. From tombs half above ground and half below, the departed are brought into the sunlight every four or five years and wrapped in new silk. Not a sad occasion, the reunion with an ancestor marks a time for singing and dancing. Celebrants joyfully toss the body into the air and catch it again. Cattle are sacrificed, their horns left to adorn the top of the tomb.

The body is re-interred, there to rest until the next *famadihana*, the turning of the dead.

Despite the nearness of Africa, the ancestry of Madagascar's peoples is predominately Malayan and Polynesian. Migrants, historians theorize, sailed across the Indian Ocean in outrigger canoes to colonize an island home like no other on earth. Here they found nightmarish forests of cactuslike *Didierea*. Here roamed monkeylike lemurs with bat's ears and flowing foxtails; primitive tenrecs pincushioned with quills; and aepyornis, the now-extinct flightless bird that weighed half a ton and laid 20-pound eggs.

Independent of France since 1958, Madagascar carves a niche in world society uniquely its own. To follow its saga of development, as well as that of other emerging nations, readers turn each month to the pages of NATIONAL GEOGRAPHIC.



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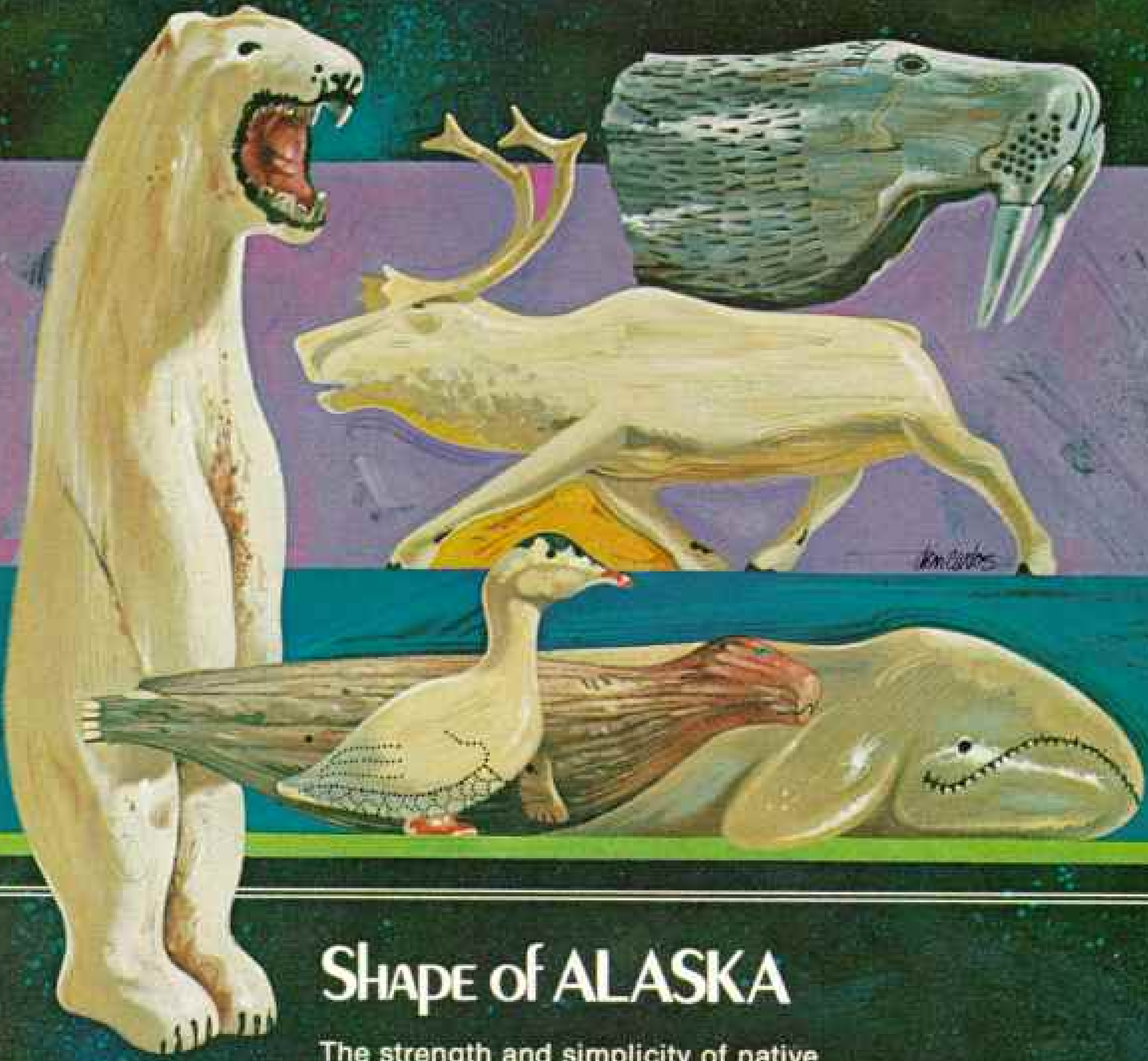

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PHILLIPS 66

The Performance Company

Illustrated: Ivory, bone and wood carvings by Alaskan Eskimo artisans, collected over the last century during Smithsonian Institution expeditions.